S&P Dow Jones Indices

S&P Global

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STRATEGY 201

Measuring Volatility in Australia

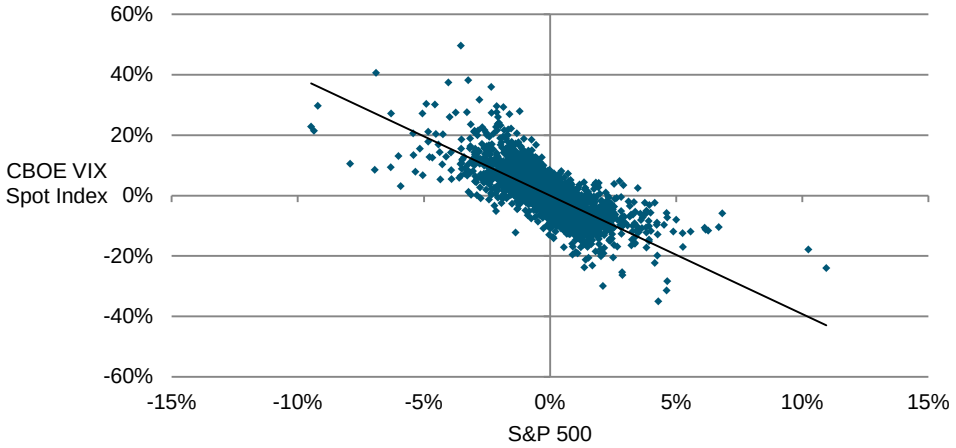
Launched in March 2013, the real-time S&P/ASX 200 VIX® is designed to measure the expected 30-day volatility of the Australian benchmark equity index, the S&P/ASX 200. It uses the same methodology as the widely followed CBOE Volatility Index (VIX), which is designed to measure market expectations of near-term volatility embedded in S&P 500® options prices. Since its introduction in 1993, VIX has been viewed as the "investor fear gauge" for the equity market. In March 2004, the CBOE Futures Exchange (CFE) began trading futures on VIX, and this has become one of the most successful futures products traded on the CFE. Due to growing interest and demand from investors, the CFE extended trading hours for VIX futures in June 2014.[1]

How is VIX computed?

- Select first- and second-month OTM puts and OTM calls
- Compute implied volatility for each maturity
- Derive 30-day implied volatility from interpolation

The success of VIX derivatives is largely due to their potential ability to hedge against the U.S. equity market. Since VIX spot is derived from S&P 500 options prices and the equity options market is largely driven by market hedgers, VIX spot usually increases when investors rush to buy put options to protect their market exposure in a foreseeable bear market. By the same token, VIX spot tends to decline when investors have a more optimistic view and reduce their hedging. From Jan. 1, 2000, to April 30, 2016, the correlation between VIX spot and the S&P 500 was approximately -76%. Exhibit 1 shows a clear negative correlation between VIX and S&P 500 returns.

Exhibit 1: CBOE VIX and S&P 500 Returns



Source: S&P Dow Jones Indices LLC. Data from Jan. 1, 2000, to April 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

[1] Beginning on Sunday, June 22, 2014, at 5:00 p.m., CFE expanded trading hours for VIX futures, allowing them to be traded nearly 24 hours per day, five days per week. Specifically, the trading week for VIX futures now begins on Sunday at 5:00 p.m. and ends on Friday at 3:15 p.m. CFE is closed for trading on Monday through Thursday for 15 minutes between 3:15 p.m. and 3:30 p.m., and trading for the new business day begins at 3:30 p.m. on Monday through Thursday. CFE closes at 3:15 p.m. on Friday and remains closed until 5:00 p.m.

The negative correlation between VIX and the S&P 500 indicates that these two indices often move in opposite directions. Additionally, this negative correlation tends to be more pronounced in a stressed market than in a market rally. In other words, when the equity market declines sharply, VIX usually rises quickly; when the equity market rises, VIX generally declines slowly or hovers at a relatively low level. As a rule of thumb, high VIX levels are typically associated with a bear market.

The Australian equity market is only moderately correlated with the U.S. market.

Although market participants cannot trade VIX spot itself, they can use derivatives that track VIX, including futures and options. These derivatives may have different characteristics than the spot index, but they still maintain the potential hedging property of the spot index. Exhibit 2 shows the correlations among the S&P 500, VIX spot, and two VIX futures benchmark indices in the U.S.

Exhibit 2: Correlation Among the S&P 500, VIX Spot, and Two VIX Futures Indices

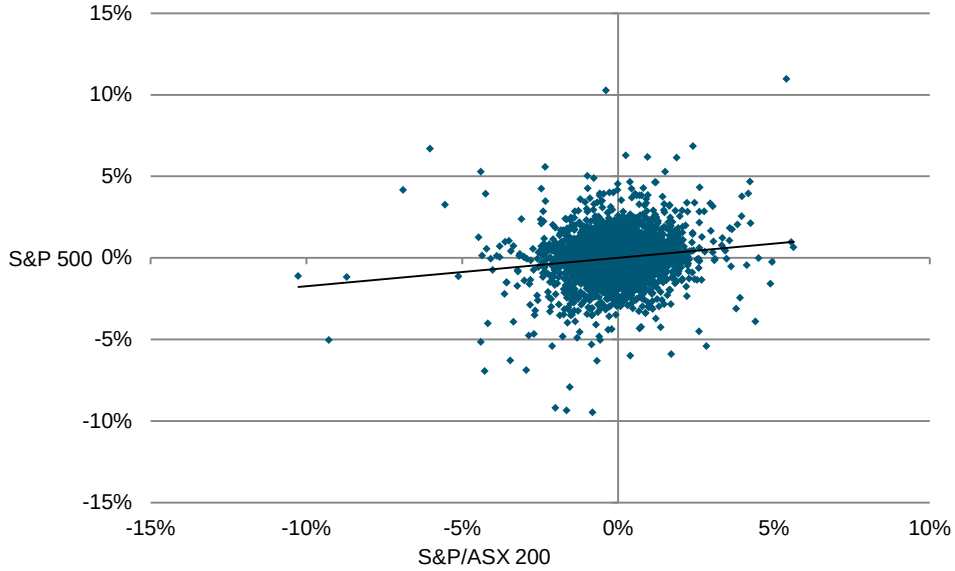
Index	S&P 500 (%)	VIX Spot (%)	S&P 500 VIX Short-Term Futures Index (%)	S&P 500 VIX Mid-Term Futures Index (%)
S&P 500 (%)	100	-75.53	-75.88	-74.74
VIX Spot (%)	-	100	88.56	79.80
S&P 500 VIX Short-Term Futures Index (%)	-	-	100	61.68
S&P 500 VIX Mid-Term Futures Index (%)	-	-	-	100

Source: S&P Dow Jones Indices LLC. Data from Dec. 20, 2005, to April 30, 2016. 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.

For investors with exposure to the Australian equity market, some natural questions include the following. How can we measure implied volatility in the local market? Is VIX a good proxy and an effective hedge to the Australian market? To answer these questions, we need to take a look at the correlation between the Australian and U.S. equity markets.

Unfortunately, the Australian equity market is only slightly correlated with the U.S. market. From Jan. 1, 2000, to April 30, 2016, the correlation between the S&P/ASX 200 and the S&P 500 was just 14%. Consequently, VIX is neither a good measure of the Australian equity market's implied volatility nor an effective source of hedging potential for this market. Exhibit 3 shows that the U.S. and Australian equity markets have a low correlation in general.

Exhibit 3: S&P/ASX 200 and S&P 500 Returns



Source: S&P Dow Jones Indices LLC. Data from Jan. 1, 2000, through April 30, 2016. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

The S&P/ASX 200 VIX applies the VIX methodology to S&P/ASX 200 options.

Responding to the need for a VIX-type index reflecting Australian equity market uncertainty, S&P Dow Jones Indices launched the S&P/ASX 200 VIX in 2010. To calculate the index, the real-time mid prices of the S&P/ASX 200 put and call options are used to derive a weighted average of the implied volatility in these options. First- and second-month options are used in the calculation. When the first-month options are due to expire in less than a week, the calculation is rolled to the second- and third-month contracts.

The index provides a better measure of uncertainty in this market than VIX, as reflected by its strong negative correlation to the S&P/ASX 200. From Jan. 1, 2008, through April 30, 2016, the S&P/ASX 200 VIX demonstrated a -68% correlation to the local equity market, while VIX showed just a -14% correlation.

Exhibit 4: Correlation Among the S&P 500, the S&P/ASX 200, VIX Spot, and the S&P/ASX 200 VIX

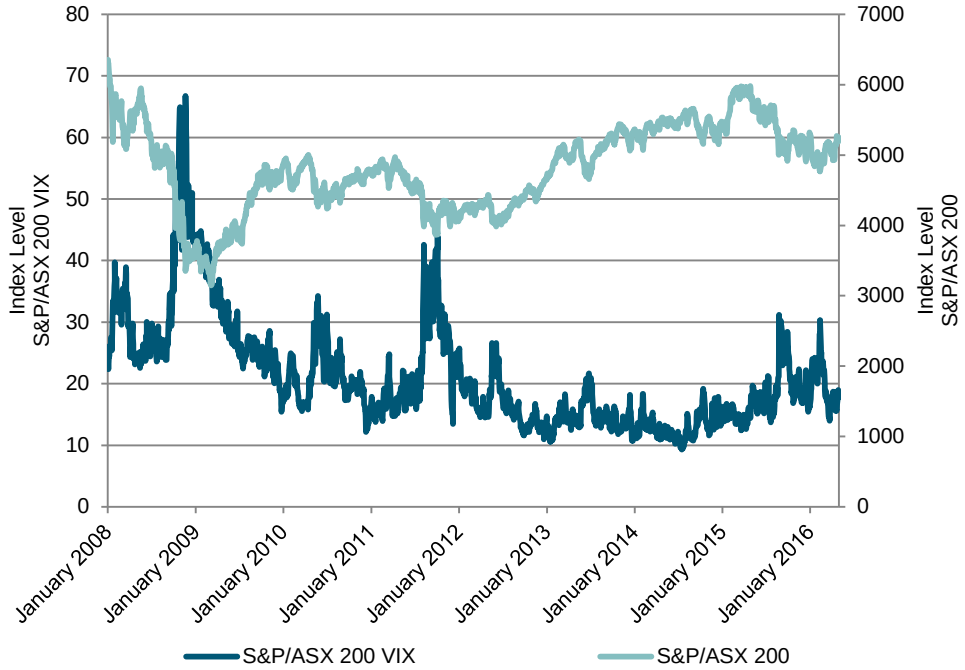
Index	S&P/ASX 200 (%)	S&P 500 (%)	VIX Spot (%)	S&P/ASX 200 VIX (%)
S&P/ASX 200	100	14.22	-13.76	-67.70
S&P 500	-	100	-74.95	-10.66
VIX Spot	-	-	100	14.42
S&P/ASX 200 VIX	-	-	-	100

Source: S&P Dow Jones Indices LLC. Data from Jan. 1, 2008, to April 30, 2016. 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. The S&P/ASX 200 VIX was launched on Sept. 21, 2010.

Exhibit 5 shows the performance history of the S&P/ASX 200 VIX and the S&P/ASX 200. Besides showing the negative correlation between these two indices, it also demonstrates that the negative correlation tended to

peak in bear markets, historically. In the second half of 2008, for instance, the correlation was -75%.

Exhibit 5: Performance History of S&P/ASX 200 and S&P/ASX 200 VIX



Source: S&P Dow Jones Indices LLC. Data from Jan. 1, 2008, to April 30, 2016. 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.

The S&P/ASX 200 VIX is a better measure of Australian market risk than VIX, and it has a strong negative correlation with the local market.

The S&P/ASX 200 VIX surged 39% on Aug. 25, 2015, right after world markets decreased as Chinese stocks crashed. The index remained above the realized volatility level for the majority of 2015, except for short periods in January, July, and October. Historically, rising volatility has tended to benefit market participants with long positions in volatility or short positions in equity.

CONCLUSION

VIX serves as an “investor fear gauge” for the U.S. equity market. Derivatives that track VIX are widely used to hedge broad market risk in the U.S. However, the Australian equity market is only slightly correlated to the U.S. market, meaning that VIX is a poor measure of Australian market risk.

The S&P/ASX 200 VIX applies the VIX methodology to S&P/ASX 200 options. It is a better measure of Australian market risk than VIX and has a strong negative correlation with the local market.

PERFORMANCE DISCLOSURE

The S&P/ASX 200 VIX was launched on Sept. 21, 2010. The S&P 500 VIX Short Term Futures Index was launched on May 10, 2010. The S&P 500 VIX Mid Term Futures Index was launched on Jan. 22, 2009. All information presented prior to the launch date is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at www.spdji.com. It is not possible to invest directly in an index.

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 the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which 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 datafeed to external parties. For Dow Jones-branded indicates 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.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index 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. Please refer to the methodology paper for the Index, available at www.spdji.com 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.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested 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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