

CBOE STRATEGY BENCHMARK INDEXES

CBOE S&P 500[®] SMILESM INDEX

HISTORICAL RETURNS

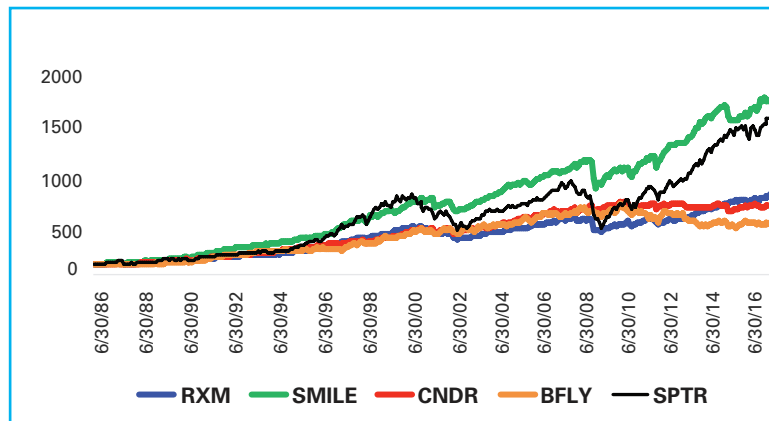
The CBOE S&P 500 SMILE Index (Ticker: SMILE) is a premium-capture strategy conditioned on the implied volatility smile of S&P 500 Index (SPX) options. The implied volatility smile refers to the pattern of implied volatilities across option strike prices. A flatter smile tends to be observed at market bottoms and conveys a higher probability of a market upturn. The Index overlays 25 delta put and 25 delta call options on a one-month Treasury bill account that largely collateralizes the option risk. The put is always sold short. The call is also sold short when the implied volatility smile steepens such that the ratio of the put and call premium is greater than 1.5. Otherwise, the call is bought. Since June 1986, the call has been sold 64% of the time. The index is rolled monthly on the expiration date of standard (a.m.-settled) SPX options, usually the third Friday of the month.

SMILE INDEX PERFORMANCE TO DATE

	9/30/16	1M	3M	YTD	1Y
CBOE SMILE INDEX		0.97%	-0.12%	4.53%	9.36%
CBOE RXM INDEX		0.97%	3.47%	5.38%	9.23%
CBOE BFLY INDEX		-0.11%	-1.51%	-1.18%	-2.42%
CBOE CONDOR INDEX		1.12%	0.34%	-1.39%	1.83%

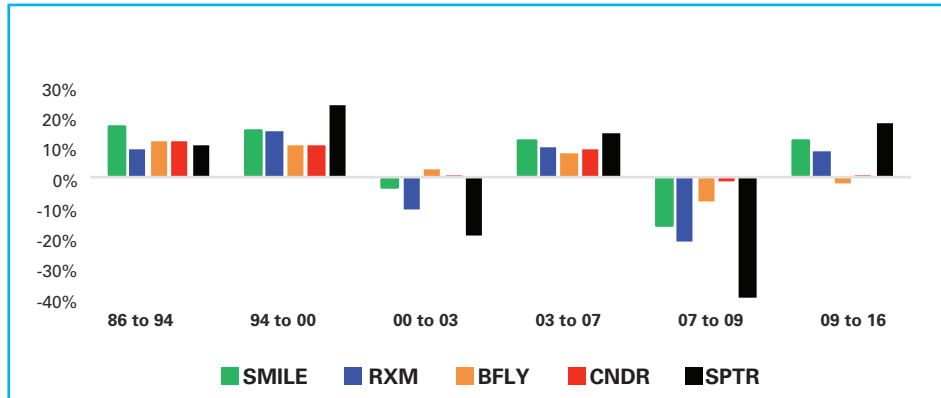
Source: CBOE

CUMULATIVE RETURNS 1986 – SEP 2016



Source: CBOE

ANNUAL RETURNS IN BEAR AND BULL CYCLES

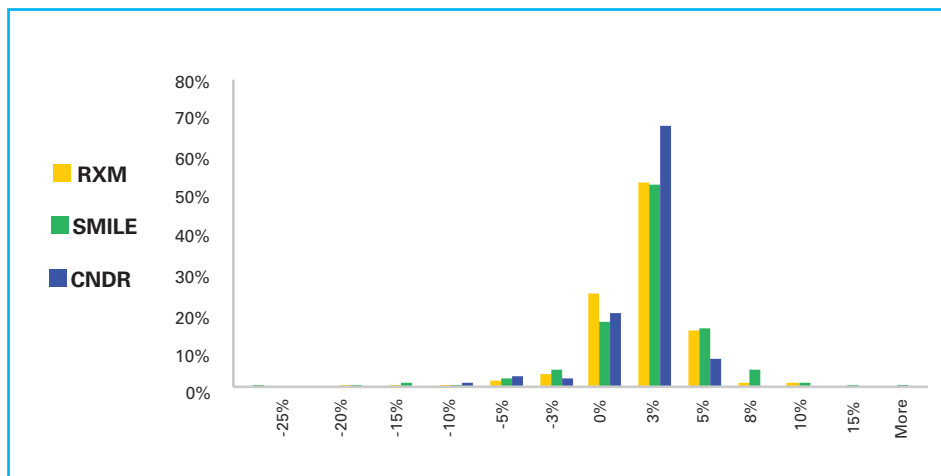


Source: CBOE

The SMILE Index is related to the CBOE S&P 500 Risk Reversal Index (RXM), which tracks a risk-reversal strategy: Treasury bills combined with a short 25 delta SPX put and a long 25 delta SPX call overlay, which is rolled on a monthly basis. The SMILE Index alternates between the RXM Index option portfolio and a short option strangle (short put and short call) conditional on the shape of the implied volatility curve of SPX options. The SMILE Index is also related to the CBOE S&P 500 Iron Condor Index (CNDR) and CBOE S&P 500 Iron Butterfly Index (BFLY), two alternative premium capture strategies that are short put and call spreads. Over the period from June 1986 to September 2016, the SMILE Index had lower returns than the S&P 500 Total Return Index (SPTR) in most bull cycles and higher returns in bear cycles.

RISK AND RETURN PROFILE

FREQUENCY DISTRIBUTIONS OF MONTHLY RATES SINCE 1986



Source: CBOE

SUMMARY STATISTICS

SINCE 1986	SMILE	RXM	CNDR	BFLY
Mean	0.84%	0.63%	0.58%	0.52%
Std. Dev.	2.49%	2.52%	2.08%	3.11%
Neg. Dev.	3.70%	3.32%	3.15%	2.90%
Skew	-2.13%	-2.15%	-2.08%	0.01%
Kurt	11.77%	13.05%	5.94%	-0.41%
Sharpe	0.23%	0.15%	0.15%	0.08%
Sortino	0.16%	0.11%	0.10%	0.09%

Source: CBOE

RELATIVE PERFORMANCE

1986 to 2016	Mean Monthly Rates in Each SPTR Bracket					
SPTR Bracket	Frequency	SPTR	SMILE	RXM	BFLY	CNDR
-20%	0.3%	-21.61%	-13%	-14%	-6%	-10%
-15%	0.3%	-16.79%	-15%	-18%	-2%	-7%
-10%	0.8%	-11.99%	-2%	-5%	-4%	-1%
-8%	3.0%	-8.40%	-3.52%	-4.37%	-2.83%	-3.10%
-5%	5.8%	-5.80%	-1.52%	-2.25%	-1.12%	-1.06%
-3%	9.0%	-3.37%	0.15%	-0.96%	0.57%	0.64%
0%	17.7%	-1.33%	0.86%	-0.02%	1.17%	0.95%
3%	29.3%	1.31%	1.15%	0.79%	1.11%	1.02%
5%	20.4%	3.66%	1.30%	1.74%	0.25%	0.68%
8%	9.4%	6.00%	2.16%	3.23%	0.58%	0.88%
10%	4.4%	8.47%	2.22%	3.26%	0.30%	1.07%
15%	0.8%	11.92%	6.88%	6.75%	2.79%	0.61%

Source: CBOE

The Summary Statistics table shows that the SMILE Index has a higher mean return than the RXM, CNDR and BFLY indexes, comparable negative deviation and greater Sharpe and Sortino ratios.

Each row of the Relative Performance table above shows the average monthly rate of return bracket for SPTR, the percent of months during which the rate of SPTR falls in that bracket and the average monthly rate of return for other indices when the SPTR rate is in that bracket. Each row/SPTR bracket is shaded from red (worst average rate) to dark green (best average rate). The strength of the SMILE Index is its overall good relative performance in all market conditions.

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