

STANDARD  
&POOR'S

# S&P 500 VOLATILITY ARBITRAGE INDEX

INDEX METHODOLOGY

January 2008

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# Introduction

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The S&P 500 Volatility Arbitrage Index seeks to model a common strategy that takes advantage of the difference between implied volatility and realized volatility. The S&P 500 Volatility Arbitrage Index consists of receiving implied variance of the S&P 500 and paying realized variance of the S&P 500.

## **Highlights**

Volatility arbitrage strategies are based on the tendency for implied volatility of an asset to be higher than realized volatility. Due to this it historically has been a profitable strategy to receive implied volatility and pay realized volatility.

The S&P 500 Volatility Arbitrage Index approximates the payout from a one-month variance swap that consists of receiving implied variance of the S&P 500 and paying realized variance of the S&P 500.

The index is calculated and disseminated once a month on the third Friday of each month.

A total return version of the index is calculated, which includes interest accrual on the notional value of the index based on the 1-month US Dollar LIBOR rate.

## **Index Family**

The Index belongs to the S&P Arbitrage Index Family. Other indices in the family are the S&P Currency Arbitrage Index and The S&P Long Only Merger Arbitrage Index.

# Index Construction

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## Approaches

The index is rebalanced once a month on the third Friday of each month. The methodology approximates a one-month variance swap position that receives implied variance on the S&P 500, as measured by VIX<sup>1</sup>, and pays realized variance on the S&P 500. The total return version of the index incorporates interest accrual on the notional value of the index. Interest accrues based on the 1-month US Dollar LIBOR rate.

## Index Calculations

On any rebalancing date,  $t$ , the index is calculated as follows:

$$IndexValue_t = IndexValue_{t-1} * (1 + VolArbStrategy_t) \quad (1)$$

where:

$IndexValue_{t-1}$  = The index value as of the last rebalancing date ( $t-1$ ).

$VolArbStrategy_t$  = A percentage, as determined by the following formula:

$$VolArbStrategy_t = VarianceNotional_{t-1} * \left[ (IVS_{t-1})^2 - (RVS_{t-1,t})^2 \right] \quad (2)$$

where:

$t-1$  = The last rebalancing date

$IVS_t$  = Implied Volatility Strike. On any rebalancing date,  $t$ , it is represented by the equally weighted average of the levels of VIX®, the CBOE Volatility Index as published by the CBOE, minus 1%. The average is calculated using the index levels as published by the CBOE every 5 minutes from, and including, 12:00 pm to, and including, 01:00 pm (ET), divided by 100. For index history prior to January, 18, 2007,  $IVS_t$  is represented by the average of the high value and low value of VIX® as published by the CBOE, divided by 100, minus 1%.

$RVS_{t-1,t}$  = Realized Volatility Strike of the S&P 500 calculated using the following formula:

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<sup>1</sup> VIX® is the trademark for the Chicago Board Option Exchange Volatility Index, a measure of the implied volatility of the S&P 500 index options. It measures the market's expectation of volatility over the next 30 days.

$$RVS_{t-1,t} = \sqrt{\frac{252 * \sum_{i=1}^n \ln\left(\frac{Index_i}{Index_{i-1}}\right)^2}{n}} \quad (3)$$

where:

$Index_i$  = The closing price of the S&P 500 on day  $i$ .

$n$  = The number of trading days from, and including, the prior rebalancing date,  $t-1$ , but excluding the current rebalancing date,  $t$ .

$$VarianceNotional_t = \frac{1}{2 * IVS_t} * Vega \quad (4)$$

where:

$Vega$  = A limit to the exposure on the spread. 30% is used for this index.

### Total Return Index

A total return version of the index is calculated, which includes interest accrual on the notional value of the index based on the 1-month US Dollar LIBOR rate, as follows:

$$TRIV_t = TRIV_{t-1} * \left(1 + LIBOR_{t-1} * (d_{t-1,t} / 360) + VolArbStrategy_t\right)$$

where:

$TRIV_t$  = Total return index value as of the current rebalancing date,  $t$ .

$TRIV_{t-1}$  = Total return index value as of the last rebalancing date,  $t-1$ .

$d_{t-1,t}$  = Count of calendar days from the prior rebalancing date,  $t-1$ , to the current rebalancing date,  $t$ , but excluding the prior rebalancing date.

$LIBOR_{t-1}$  = 1 month US Dollar LIBOR rate as of the last rebalancing date,  $t-1$ .

### Base Date

The index base date is February 16, 1990 at a base value of 100.

# Index Governance

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## **Index Committee**

The S&P Arbitrage Index Committee maintains the S&P 500 Volatility Arbitrage Index. The Index Committee meets regularly. At each meeting, the Index Committee reviews any significant market events. In addition, the Index Committee may revise index policy for timing of rebalancings or other matters.

Standard & Poor's considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

# Index Policy

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## **Announcements**

Announcements of the monthly index values are made after close of third Friday of each month.

## **Holiday Schedule**

The index is calculated once a month on the third Friday of each month to coincide with the S&P 500 options expiration. If the third Friday of a particular month is a holiday for U.S. exchanges, the index will be calculated on whatever day represents options expiration for the month in question, generally the third Thursday of the month.

## **Unscheduled Market Closures**

In situations where an exchange is forced to close early due to unforeseen events, such as computer or electric power failures, weather conditions or other events, Standard & Poor's will calculate the value of the index based on (a) in respect to the S&P 500 index the most recent value published by Standard & Poor's and (b) in respect to the VIX Index, the equally weighted average of the 13 levels of VIX®, as published by the CBOE every 5 minutes for a one-hour period immediately prior to the event. If an exchange fails to open due to unforeseen circumstances, the index will use the equally weighted average of the 13 levels of VIX®, as published by the CBOE every 5 minutes for the final one-hour period of the prior day although Standard & Poor's may determine not to publish the index for that day.

# Index Dissemination

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Historical index returns are available through Standard & Poor's index data group for subscription via FTP.

## **Tickers**

	<b>Bloomberg</b>	<b>Reuters</b>
S&P 500 Volatility Arbitrage Index	SPARBV	.SPARBV
S&P 500 Volatility Arbitrage Total Return Index	SPARBVT	.SPARBVT

# S&P Contact Information

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