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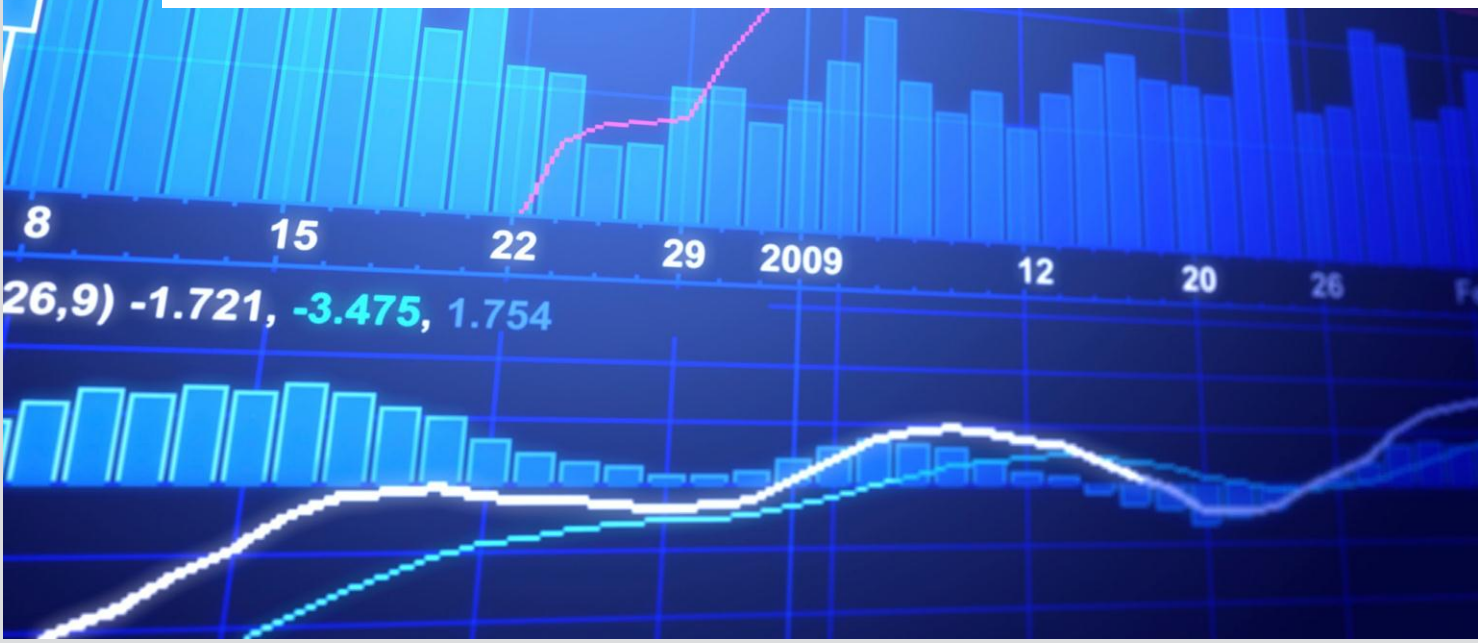
Index Methodology | As of July/2015

CBOE Strategy Benchmark Indexes

The CBOE S&P 500 One-Week PutWrite Index (WPUT)



THE CBOE S&P 500 One-Week PutWrite Index (WPUT)

Introduction:

The CBOE S&P 500 One-Week PutWrite Index (WPUT) is designed to track the performance of a hypothetical passive investment strategy that collects option premiums from writing an At-the-Money (ATM) SPX Put option on a weekly basis and holds a rolling money market account invested in one-month Treasury bills to cover the liability from the short SPX Put option position.

Index Design:

On January 13, 2006, the initial roll date of the WPUT Index, an ATM one week SPX Put option is written after the market opens (9:30 am ET). The first available SPX Put option strike below the Special Opening Quotation (SOQ) of the S&P 500 Index (SPX Index) is selected. The first bid quote after the market opens is the option premium collected from the written SPX Put option. At the same time, *$K* cash is invested in a money market account to cover the liability of the short SPX Put option position, where K is the strike price of the expiring SPX Put option.

Typically, on every Friday (Roll Day) since the initial roll date, the SPX Put option settles and the money market account is liquidated simultaneously. Concurrently, a new ATM SPX Put option (to expire in one week) is written, and a new money market account (K_{new}) is set aside as collateral for the new short ATM SPX Put option. The money market account will accumulate interest at one-month T-bill rate.

As the expiring SPX Put Option can be either an AM-settlement or PM-settlement on the Roll Date, this would affect the settlement procedure of the expiring SPX Put option. If the expiring SPX Put option is AM-settlement on the Roll Date, the expiring SPX Put option settles against the SOQ. If the expiring SPX Put option is PM-settlement on the Roll Date, the expiring SPX Put option is purchased back at the last ask price of the SPX Put option before 4:00 pm ET.

For AM-settlement, the first available SPX Put option strike below the SOQ is selected, and the option premium collected is the first bid quote of the SPX Put option after 9:30 am ET. For PM-settlement, the first available SPX Put option strike below the last disseminated value of the SPX Index before 4:00 pm ET is selected, and the option premium collected is the last bid quote of the SPX Put option before 4:00 pm ET. In either case, a money market account with initial cash *$K*, where K is the strike price of the new SPX Put option, is set up simultaneously to cover the potential liability of the short SPX Put option position.

Index Calculation:

The WPUT Index value is calculated by CBOE in real-time, every 15 seconds.

<u>On each trading day excluding roll dates, the daily return of the index is calculated as:</u>

$$R_t = (M_t - Put_t) / (M_{t-1} - Put_{t-1})$$

$$M_t = R_f * M_{t-1}$$

Where M_t and M_{t-1} are the values of the money market account on day *t* and *t-1*, respectively, R_f is the one-month T-bill rate de-annualized to the daily rate, Put_t is the average of the last bid-ask quote of the SPX Put option before 4:00 pm ET, and Put_{t-1} is the average of the last bid-ask quote of the SPX Put option before 4:00 pm ET on the previous day.

<u>On Roll Days, for AM-settlement and PM-settlement, the calculations are as follows:</u>

<u>For AM-settlement Roll Days:</u>

First, calculate the return from the previous day market close to morning settlement (9:30 am ET):

$$R_1 = (M\_old_{t-1} - Put\_old_{settle}) / (M\_old_{t-1} - Put\_old_{t-1})$$

Where $Put\_old_{settle} = Max(0, K_{old} - SOQ_t)$ is the settlement value of the expiring SPX Put option, Put_old_{t-1} is the average of the last bid-ask quote of the expiring SPX Put option before 4:00 pm ET on the previous day, and M_old_{t-1} is the value of the money market account on the previous day. Note interest is not accumulated in the money market account on the Roll Day.

Second, calculate the return from morning settlement to market close:

$$R_2 = (M\_new_t - Put\_new_t) / (M\_new_t - Put\_new_{bid\ 930})$$

Where $M\_new_t = K_{new}$ is the cash allocated to cover the potential loss of the new SPX Put option on the Roll Day, Put_new_t is the average of the last bid-ask quote of the new SPX Put option before 4:00 pm ET, and $Put\_new_{bid\ 930}$ is the first bid quote of the new SPX Put option after 9:30 am ET. Note interest is not accumulated in the money market account on the Roll Day.

The product of the two parts is the total return of the Roll Day:

$$R_t = R_1 * R_2$$

For PM-settlement days:

First, calculate the return from the previous day to 4:00 pm ET:

$$R_1 = (M\_old_{t-1} - Put\_old_{ask\ 4pm}) / (M\_old_{t-1} - Put\_old_{t-1})$$

Where $Put\_old_{ask\ 4pm}$ is the last ask quote of the expiring SPX Put option before 4:00 pm ET, Put_old_{t-1} is the average of the last bid-ask quote of the expiring SPX Put option before 4:00 pm ET on the previous day, and M_old_{t-1} is the value of the money market account on the previous day.

Second, calculate the return from 4:00 pm ET to market close (4:15 pm ET). The rationale is that the new SPX Put option is sold at 4:00 pm ET at the bid price, but to calculate the index value at market close, we use the average of the last bid-ask quote of the new SPX Put option before 4:00 pm ET:

$$R_2 = (M\_new_t - Put\_new_t) / (M\_new_t - Put\_new_{bid\ 4pm})$$

Where $M\_new_t = K_{new}$ is the cash allocated to cover the potential loss of the new SPX Put option on the Roll Day, Put_new_t is the average of the last bid-ask quote of the new SPX Put option before 4:00 pm ET, and $Put\_new_{bid\ 4pm}$ is the last bid quote of the new SPX Put option before 4:00 pm ET. Note interest is not accumulated in the money market account on the Roll Day.

The product of the two parts is the total return of the Roll Day:

$$R_t = R_1 * R_2$$

Once the daily return is calculated for every trading day, the daily index value is calculated as:

$$INDEX_t = INDEX_{t-1} * R_t$$

Options involve risk and are not suitable for all investors. Prior to buying or selling an option, a person must receive a copy of Characteristics and Risks of Standardized Options. Copies are available from your broker, by calling 1-888-OPTIONS, or from The Options Clearing Corporation, One North Wacker Drive, Suite 500, Chicago, Illinois 60606 or www.theocc.com. The CBOE S&P 500 One-Week PutWrite Index (WPUT) is designed to represent a proposed hypothetical yield enhancement strategy. Like many passive indexes, the WPUT Index does not take into account significant factors such as transaction costs and taxes and, because of factors such as these, many or most investors should be expected to underperform passive indexes. In the construction of the hypothetical WPUT index, the WPUT options are assumed to be sold at a certain price at a certain time(s) of the month. However, there is no guarantee that all investors will be able to sell at this price, and investors attempting to replicate the WPUT Index should discuss with their brokers possible timing and liquidity issues. Transaction costs and taxes for a strategy such as the WPUT could be significantly higher than transaction costs for a passive strategy of buying-and-holding stocks. Investors should consult their tax advisor as to how taxes affect the outcome of contemplated options transactions. Past performance does not guarantee future results. This paper contains index performance data based on back-testing, i.e., calculations of how the index might have performed prior to launch. Back-tested performance information is purely hypothetical and is provided in this document solely for information purposes. Back-tested performance does not represent actual performance and should not be interpreted as an indication of actual performance. It is not possible to invest directly in an index. Chicago Board Options Exchange, Incorporated (CBOE) calculates and disseminates the WPUT index.

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