

# Option Pricing Models Interfaces and Methods

**ISpanOptionPricingModel: IDispatch** interface methods:

## **PutExerciseStyle(short)**

Sets Option ExerciseStile

Parameter value:

0 for American (Default value)

1 for European.

Returns 0 (success) or non-zero (failure).

## **PutOptionTypelsCall(BOOL);**

Sets option type.

Returns 0 (success) or non-zero (failure).

## **PutUndPrice(double);**

Sets price of the underlying instrument.

Returns 0 (success) or E\_UNDERPICE (failure).

## **PutStrikePrice(double);**

Sets option strike price.

Returns 0 (success) or E\_STRIKEPRICE (failure).

## **PutVolatility(double);**

Sets volatility of the underlying instrument.

Returns 0 (success) or E\_VOLATILITY (failure).

## **PutRiskFreeRate(double);**

Sets risk free interest rate.

Returns 0 (success) or E\_RISKFREERATE (failure).

## **PutDivYield(double);**

Sets underlying instrument dividend yield.

Returns 0 (success) or E\_DIVYIELD (failure).

## **PutExpirTime(double);**

Sets option expiration time.

Returns 0 (success) or E\_TIMETOEXPIR (failure).

## **PutUnderlyingAssetType(short);**

Sets Underlying Asset Type for "Greeks" Calculations.

Parameter value:

0 for Futures (Default)

1 for Physicals.

Returns 0 (success) or non-zero (failure).

**PutAllGreeksFlag (bool);**

Sets flag for all Greeks Calculation.

Returns 0 (success) or non-zero (failure).

**PutDeltaFlag (bool);**

Sets flag for Delta Calculation.

Returns 0 (success) or non-zero (failure).

**PutVegaFlag (bool);**

Sets flag for Vega Calculation.

Returns 0 (success) or non-zero (failure).

**PutGammaFlag(bool);**

Sets flag for Gamma Calculation.

Returns 0 (success) or non-zero (failure).

**PutThetaFlag (bool);**

Sets flag for Theta Calculation.

Returns 0 (success) or non-zero (failure).

**PutRhoFlag (bool);**

Sets flag for Rho Calculation.

Parameter value:

Defaults for all "Greek" **Flags** set to **true** for Merton model, but **false** for Whaley and Cox-Ross-Rubinstein models because they are computationally expensive.

Returns 0 (success) or non-zero (failure).

**PutUndPriceChange(double);**

Sets price of the underlying instrument.

Returns 0 (success) or E\_UNDERPRICE (failure) if Zero change.

**PutVolatilityChange (double);**

Sets volatility of the underlying instrument.

Returns 0 (success) or E\_VOLATILITY (failure) ) if Zero change.

**PutExpirTimeChange (double);**

Sets option expiration time.

Returns 0 (success) or E\_TIMETOEXPIR (failure) ) if Zero change.

**PutRiskFreeRateChange (double);**

Sets risk free interest rate.

Returns 0 (success) or E\_RISKFREERATE (failure) ) if Zero change.

**PutDivYieldChange (double);**

Sets underlying instrument dividend yield.

Parameter value:

Defaults for Changes set to 0.01% for all **Change** methods.

Returns 0 (success) or E\_DIVYIELD (failure) ) if Zero change.

**Calculate();**

Calculates theoretical prices for an option.

Returns 0 (success) or non-zero failure codes: E\_FAIL , S\_NOTCONVERGE, E\_OUTOFMEMORY

**GetPrice(double\*);**

Gets option theoretical price.

Returns 0 (success) or non-zero (failure).

**GetDelta(double\*);**

Gets option delta.

Returns 0 (success) or non-zero (failure).

**GetVega(double\*);**

Gets option vega.

Returns 0 (success) or E\_NOTIMPL (failure).

**GetTheta(double\*);**

Gets option theta.

Returns 0 (success) or E\_NOTIMPL (failure).

**GetGamma(double\*);**

Gets option gamma of the underlying instrument.

Returns 0 (success) or E\_NOTIMPL (failure).

**GetRho(double\*);**

Gets option rho.

Returns 0 (success) or E\_NOTIMPL (failure).

**GetIntinsicValue(double\*);**

Gets Intrinsic Value.

Returns 0 (success) or non-zero (failure).

**GetCostOfCarry(double\*);**

Gets CostOfCarry.

Returns 0 (success) or non-zero (failure).

**GetExpirTime(double\*);**

Gets option expiration time.

Returns 0 (success) or non-zero (failure).

**ISpanMertonPricingModel: ISpanOptionPricingModel** interface has following methods used for analytical calculations of European Options prices on Equities or Futures:

**GetSpanNormalProbability(ISpanNormalProbability\*);**

Gets a pointer to the ISpanNormalProbability interface.

Returns 0 (success) or non-zero (failure).

**ISpanWhaleyPricingModel: ISpanOptionPricingModel** interface has following methods for numerical calculation of American Options on Futures:

**PutMaxIterations(long);**

Sets max number of iterations.

Returns 0 (success) or non-zero (failure).

**PutConvergeTreshhold (double);**

Sets Convergence Treshhold.

Returns 0 (success) or non-zero (failure).

**GetCriticalPrice();**

Gets critical price.

Returns 0 (success) or non-zero (failure).

**GetModelIterations(long);**

Gets number of iterations.

Returns 0 (success) or non-zero (failure).

**ISpanCoxRossRubPricingModel: ISpanOptionPricingModel** interface has following methods for numerical calculation of American Options on Futures and Equities

**PutTreeDimension(long);**

Returns 0 (success) or E\_TREEDIM (failure).

**ISpanOptionVolatilityModel: IDispatch** interface has following methods used for numerical calculations of Implied volatilities running backward SpanOptionPricingModel:

**PutSpanOptionPricingModel(ISpanOptionModel\*);**

Sets a pointer to the ISpanOptionPricingModel interface.

Returns 0 (success) or non-zero (failure).

**PutPrice(double\*);**

Gets option theoretical price.

Returns 0 (success) or E\_OPTIONPRICE (failure)

**PutMaxIterations(long);**

Sets max number of iterations.

Returns 0 (success) or non-zero (failure).

**PutConvergeTreshhold(double);**

Sets Convergence Treshhold.

Returns 0 (success) or non-zero (failure).

**PutLoVolatility(double);**

Sets low level for volatility range.

Returns 0 (success) or non-zero (failure).

**PutHiVolatility(double);**

Sets high level for volatility range.

Returns 0 (success) or non-zero (failure).

**PutHiVolLimit(double);**

Sets high limit for volatility.

Returns 0 (success) or non-zero (failure).

**Calculte();**

Calculates option volatility.

Returns 0 (success) or non-zero failure codes: E\_LOVOLATILITY, E\_HIVOLATILITY, or E\_INTRINSICVAL.(failure)

**GetVolatility(double);**

Gets Implied volatility for the option.

Returns 0 (success) or non-zero (failure).

**GetModelIterations(long);**

Gets number of iterations.

Returns 0 (success) or non-zero (failure).

**ISpanNormalProbability: IDispatch** interface has following methods

**PutProbabilityEventValue(double);**

Sets probability event Value.

Returns 0 (success) or non-zero (failure).

**Calculate();**

Calculates normal cumulative probability and probability density.

Returns 0 (success) or non-zero (failure).

**GetProbabilityDensity(double\*);**

Gets normal probability density.

Returns 0 (success) or non-zero (failure).

**GetCumulativeProbability(double\*);**

Gets normal cumulative probability.

Returns 0 (success) or non-zero (failure).

**Calculation Status** is represented by an HRESULT generic return code

Code Name	Code Value	Description
S_OK	0x00000000	Operation succesfull
S_NOTCONVERGE low	0x0000020B	Operation succesfull but did not converge because Max Iterations or Conversion treshhold is too low
E_NOTIMPL	0x80004001	Not Implemented
E_INVALIDARG	0x80070257	One or more arguments are invalid
E_FAIL	0x80040005	Unspecified failure
E_OUTOFMEMORY	0x8007000E	Failed to allocate necessary memory
E_UNDERPRICE	0x80040201	Underlying Price < 0 or (Underlying Price = 0 and Time to Expiration = 0)
E_STRIKEPRICE	0x80040202	Strike Price < 0 or (Strike Price = 0 and Time to Expiration = 0)
E_TIMETOEXPIR	0x80040203	Time to Expiration < 0
E_RISKFREERATE	0x80040204	Risk free Rate < 0
E_DIVYIELD	0x80040205	Dividend Yield < 0
E_VOLATILITY	0x80040206	Volatility < 0
E_TREEDIM	0x8004020C	number of time intervals on the binomial tree is <= 0.
E_OPTIONPRICE	0x80040207	Option Price <= 0

E_INTRINSICVAL	0x80040208	Option Price not worth Intrinsic value
E_LOVOLATILITY	0x80040209	"Low Volatility Guess" value is not sufficient to produce initial trial price lower than the actual price.
E_HIVOLATILITYLIM	0x8004020A	Upper Limit Value that triggers stop in searching for the sufficient "High Volatility Guess" is not sufficient. Value should be increased.
E_MAXITERATIONS	0x8004020FL	Upper bound value of iterations that triggers stop in iterations when exceeded is $\leq 0$ .
E_LOVOLATILITYVAL	0x80040210L	Low volatility guess value sufficient to produce initial trial price lower than the actual price is $< 0$ .
E_HIVOLATILITYVAL	0x80040211L	High volatility guess value sufficient to produce initial trial price higher than the actual price is $\leq 0$ .
E_HIVOLATILITYLIMVAL	0x80040212L	Upper Limit Value that triggers stop in searching for the sufficient "High Volatility Guess" is $\leq 0$ .
E_CONVERGETRESHHOLD	0x80040213L	Conversion threshold value that triggers stop in iterations when absolute difference between the trial price and the target price is less than threshold is $\leq 0$ .