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).

PutOptionTypeIsCall(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_UNDERPICE (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 opiton.

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
E_NOTIMPL	0x80004001	Not Imlemented
E_INVALIDARG	0x80070257	One or more arguments are invalid
E_FAIL	0x80040005	Unspecified failure
E_OUTOFMEMORY	0x8007000E	Failed to allocate necessary memory
E_UNDERPICE	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	Opiton 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 <=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 <=0.
E_HIVOLATILITYLIMVAL	0x80040212L	Upper Limit Value that triggers stop in searching for the sufficient “High Volatility Guess” is <= 0.
E_CONVERGETRESHHOLD	0x80040213L	Conversion treshhold value that triggers stop in iterations when absolute difference between the trial price and the target price is less than treshhold is <= 0.