

Claims

[Revendication 1] A computer implemented method for determining a risk indicator comprising:

- 5 a) receiving time series for an option asset, each element of said time series comprising an option asset price, an option asset strike price, an option asset maturity chosen among a finite number of maturity values, as well as time series for the underlying asset values, and determining for each time instant of both time series a moneyness value based on the ratio between an option asset strike price and an underlying asset value both associated with said time instant,
- 10 b) calculating a risk neutral density function of the returns for said underlying asset by
- b1) for each maturity value, using splines to interpolate a maturity based implied volatility surface based on the option asset strike price of the elements of the time series which option asset maturity value corresponds to said each
- 15 maturity value,
- b2) for each maturity value, using splines to interpolate a moneyness based implied volatility surface based on the option asset strike price of the elements of the time series which option asset maturity value corresponds to said each moneyness value, and
- 20 b3) deriving adjusted option asset prices and option asset strike prices from the moneyness and maturity based on the implied volatility surfaces of steps b2) and b3), such that the adjusted option asset prices and option asset strike prices define a substantially continuous function, and calculating the risk neutral density function of the returns for said underlying asset as a function of the second order
- 25 derivative of the option asset price with respect to the option asset strike price,
- c) determining, for said asset, a historical density of returns function, based on historical asset values,
- d) calculating, for at least some of the moneyness values in the set of moneyness values, and for at least some of the maturity values, a time series of relative risk
- 30 aversion values as a function of difference between the ratio of the first order derivative of the risk neutral density function and the risk neutral density function

and the ratio of the first order derivative of the historical density of returns function and the historical density of returns function,

e) performing a wavelet transform on the times series of relative risk aversion values regrouped by moneyiness value and maturity value to derive corresponding risk aversion frequencies, and lowpass filtering the times series of relative risk aversion values based on the relative risk aversion frequencies, so as to obtain filtered time series of relative risk aversion values regrouped by option asset strike price and maturity value,

f) for each of at least some of the maturity values, calculating daily aggregates of relative risk aversion values based on relative risk aversion values relating to a same day and chosen within the filtered time series of relative risk aversion values associated with said each of at least some of the maturity values and a moneyiness value chosen within the set of moneyiness values,

g) performing steps b) to f) over a chosen period of the past, and training a classifier with the resulting daily aggregates, said classifier being arranged to associate a state with each aggregate depending on a return value of the asset value at a fixed date following the date associated with each daily aggregate,

h) performing steps b) to f) for the current day, and feeding the resulting daily aggregates to the classifier of step g) to derive a daily risk indicator.

[Revendication 2] Method according to claim 1, wherein operation b3) includes applying a polynomial fit to the time series of relative risk aversion values.

[Revendication 3] Method according to claim 1 or 2, wherein operation c) includes applying a GARCH-like model or a Gaussian Mixture Model to calculate historical density of returns function.

[Revendication 4] Method according to one of the preceding claims, where operation e) comprises applying an inverse wavelet transform to the lowpass filtered wavelet transformed times series of relative risk aversion values regrouped by moneyiness value and maturity value.

[Revendication 5] Method according to one of the preceding claims, wherein, for a given date, the daily aggregates constitute a vector comprising at least 3 rows.

5 [Revendication 6] Method according to one of the preceding claims, wherein operation g) comprises training one or more models based on Gaussian Naive Bayes Classifier.

[Revendication 7] A computer program comprising instructions for performing the method of any of the preceding claims.

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[Revendication 8] A data storage medium having recorded thereon the computer program of claim 7.

15 [Revendication 9] A computer system comprising a processor coupled to a memory (4), the memory (4) having recorded thereon the computer program of claim 7.