

OPTION MARKET-MAKING AND RISK MANAGEMENT SYSTEM

TECHNICAL FIELD OF INVENTION

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This invention is an automatic trading system for option market makers applied to derivative markets which automatically trades and manages risks.

BACKGROUND OF THE INVENTION

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As a liquidity provider, market maker works to profit from bid-ask spread by active two-sided quoting. It is tricky to set appropriate prices that are good enough to make profit and acceptable for other market participants. Given market is changeable, market prices and risk factors variate. For example, when liquidity on one instrument is poor and some investors needs fulfilling a deal in time, selling at lower price or buying at higher price is acceptable. Under this circumstance, market maker can make more profit by widening their quoting bid-ask spread. Thus, market maker should update his or her orders from time to time. However, risk factors that need to be considered are too many, especially in option markets.

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Prior art US patent document US7856395B2 discloses a system that option contracts are traded by valuing an option that has at least one of a) strike price or b) expiration time unknown at the time the option is valued. The previously unknown values of the option are assigned at the time or after the time the trade is completed. An implied underlying price stream is generated from the option prices through the use of feedback between market participants and the marketplace. The resulting system is useful in trading option contracts of short time duration. However, there is a lack of risk management methodology and quoting system to decide how to quote and which side to quote for market maker.

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Another prior art US patent document US201192617A1 discloses a trading system and method for determining orders and their prices. A trader may request

a quote for a composite order comprising a plurality of constituent orders. The request may be provided to a pricing module located behind the trader's firewall. The pricing module may determine a quote on behalf of a pricing entity associated with a fund. The quotes may be determined based on
5 current market conditions and net tracking error that would result if the fund executed all of the constituent orders of the composite trading order. The trading module may provide the requesting trader with the requested quote, which may comprise a firm counter-order immediately executable against the composite trading order. The quote and the existence of the request may not be transmitted
10 outside the trader's firewall. The trader may execute the quote, and the pricing entity may fill all the constituent trading orders of the trader's composite trading order at the quoted price(s). However, quote sizes do not depend on user's setting or account's margin, as well as risk shades and judgment mechanism to decide whether position reducing quote works and which side to quote.

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There is a need for an automatic system to supervise market data, precisely quantify these risk factors and update orders following designed process from time to time.

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SUMMARY OF THE INVENTION

The present invention consists of features and a combination of parts hereinafter fully described and illustrated in the accompanying drawings, it being understood
25 that various changes in the details may be made without departing from the scope of the invention or sacrificing any of the advantages of the present invention.

The present invention is a system for quoting option prices in market making options, which comprises one or more options and futures orderbooks on a
30 processor having one or more ask orders and bid orders of a selected option contract in a financial product exchange. An updating module on the processor communicates with the options and futures orderbooks for receiving and refreshing the options and futures orderbook, a quoting module on the processor

communicates with the updating module for quoting option prices for the ask orders and the bid orders based on market prices when the orderbook is refreshed, and an ordering module on the processor communicates with the quoting module and the options and futures orderbooks for submitting or
 5 withdrawing an order on the exchange when the ask order or the bid order is filled.

The system of the present invention is characterized in that the selected option contract is selected based one or more strike prices and options expiries as determined by a user, and the quoting module is configured to withdraw unfilled
 10 orders when the updating module refreshes the options and futures orderbook, option expiries and option strike prices on a same underlying asset, wherein the order on the exchange is submitted and withdrawn at a high level of margin extra fees set by the user.

15 Preferably, the option price is quoted based on bid and ask prices from the orderbook, and a bid-ask spread is adjusted based on market activeness or futures liquidity, transaction fee, market fluctuation, equity or margin efficiency, profit requirement or target spread of the user, and risk management consideration.

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The system further comprising a risk management mechanism for reducing risks of holding option positions, having a risk analysis module which communicates with the updating module for refreshing the options and futures orderbooks, and for analyzing asset risks from holding option positions. There is a Greek system
 25 or a position reducing working control system which communicates with the risk analysis module for defining the asset risk.

Preferably, the Greek system for the asset risk is Delta risk, Gamma risk, Theta risk, Vega risk, Rega risk, Segal risk, or the likes, in which their corresponding risk
 30 shades for reducing risks are Delta risk shade, Gamma risk shade, Theta risk shade, Vega risk shade, Rega risk shade, Segal risk shade, or the likes.

Preferably, a risk change is done by changing the risk shade of the Greek system

or by changing a position reduction quote of the position reducing working control system when an option risk exposure is out of a risk exposure range as determined by the risk analysis module according to the user's preference settings.

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The risk shade further comprises one or more first selections for reducing risks based on option risk exposures, expiries, strikes and holding amounts, and for modifying the quoted option price and the position reduction quote according to the option risk exposure; and one or more second selections for deciding a shade
10 amount and an adjustment amount based on the asset risk, target risk ranges for each risk shade and a risk adjustment speed according to the user's preference.

Preferably, bid and ask order prices are increased when long the asset reduces the risk exposure, according to the first selections; and bid and ask order prices
15 are decreased when short the asset reduces the risk exposure, according to the first selections.

Preferably, the position reduction quote is determined by the position reducing working control system based on the refreshed options and futures orderbooks
20 and ask order or bid order quoted according to the first selection to change the asset risk, in which the ask order is quoted with an adjustment when the risk exposure is lower than preferred ranges, and the bid order is quoted with an adjustment when the risk exposure is higher than preferred ranges.

25 Preferably, the risk management mechanism reduces the Delta risk using a dynamic Delta hedge when a large Delta risk is determined by the risk analysis module, in such a way that the Delta risk is reduced by buying and selling futures.

Preferably, the dynamic Delta hedge is configured to balance between a cost and
30 a time efficiency of the Delta hedge.

Further, the system comprises a safeguard mechanism for suspending quoting or modifying the option price when the asset risk is high as determined based on

a high price fluctuation, a high margin cost, a low number of market participants and a high transaction frequency, or when the quoted option price is determined to be wrong based on a large discrepancy between the quoted price and a market mid-price, a delay in refreshing the options and futures orderbook, wrong data is received, or any combination thereof.

The present invention is able to realize a low-latency collection of market streaming data, build a set of stochastic volatility models based on online learning, visualize the account's profit and loss attributed to different risk exposures and market data, and establish a complete position management system and a quotation adjustment system.

BRIEF DESCRIPTION OF THE DRAWINGS

To further clarify various aspects of some embodiments of the present invention, a more particular description of the invention will be rendered by references to specific embodiments thereof, which are illustrated in the appended drawings. It is appreciated that these drawings depict only typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail through the accompanying drawings in which:

Fig. 1 illustrates a flow chart depicting the system modules communicating for carrying out Market Making Quote of the present invention.

Fig. 2 illustrates a flow chart depicting the whole process for carrying out Market Making Quote.

Fig. 3 illustrates a flow chart further illustrating quote pricing part of Market Making Quote in Fig. 2.

Fig. 4 illustrates a flow chart depicting the process of risk shade which is used to

adjust quote prices.

Fig. 5 illustrates a example of how a Risk Shade works for each risk type.

- 5 Fig. 6 illustrates a flow chart depicting the whole process for carrying out Position Reduce Quote.

- Fig. 7 illustrates a flow chart depicting the process of determining whether risk exposures controller of Position Reducing Quote works or not, which once works
10 will lead to Position Reducing Quote.

Fig. 8 illustrates a flow chart depicting quote pricing part of Position Reducing Quote.

- 15 Fig. 9 illustrates a flow chart depicting the process of determining whether risk exposures controller of Dynamic Delta Hedge works or not, which once works will lead to Dynamic Delta Hedge.

- Fig. 10 illustrates a flow chart depicting quote pricing part of Dynamic Delta
20 Hedge.

DETAILED DESCRIPTION OF THE INVENTION

- 25 The present invention generally relates to an automatic trading system configured in a processor of computer readable medium for option market makers to quote orders for option market making, which is applied to derivative markets which automatically trades and manages risks.

- 30 More specifically, the first part of this system relates to quoting orders for option market making named as Market Making Quote. This method gives instructions on order sizes, order prices, order establishments and cancellations. Quoting considers risk factors of the financial market including but not limited to: liquidity,

fluctuation, transaction fee, etc.

- The second part of this system relates to adjusting risk exposure to assist Market Making Quote. This system monitors positions' risks, then gives instructions to
- 5 adjust order prices in the first part or create new orders when present risks are not in preferred ranges in order to unwind them. Considered risk factors include but are not limited to option Greeks, interest rate and position concentration, according to Greek risk shades and/or position reducing working control.
- 10 The third part of this system relates to Dynamic Delta Hedge. This system gives instructions in specific Delta hedge processes based on required hedge speed and acceptable cost in order to control position's Delta exposure into a certain range.
- 15 The modules and flows for quoting option prices in market making options by the system of the present invention are as described in the following sections.

Market-Making Quote

- 20 Referring to Fig. 1, the system for quoting option prices in option market making 100 according to the first part of this invention comprises one or more options and futures orderbooks 11 on a processor of a computer-readable medium. The options and futures orderbook 11 has one or more ask orders and bid orders, which establish bid-ask spreads of a selected option contract in a financial
- 25 product exchange. Examples of exchange traded products (ETPs) can include various investments, including commodities, currencies, stocks, securities and bonds. Since prices of ETPs can fluctuate, market makers have the potential of loss from holding assets. The selected option contract is selected based one or more strike prices and options expiries as determined by a user through a settings
- 30 interface.

Referring to Fig. 2, Market Making Quote 100 gives two-sided quote instructions combining prices and sizes. The system first checks market data to make sure it

is suitable to quote in 101. These functions together guarantee enough market book depth, in-time parameters update, desired quoting options range, limited difference between calculated parameters from exchanges and own built model. After the system makes sure it is suitable to quote orders, it will decide at what price it will quote to make profit from bid-ask spread in 102 and manage risks in 103; decide at what sizes it will quote depending on user's setting in 104.

Referring to Figs. 1 and 3, there is an updating module 12 on the processor which communicates with the options and futures orderbooks for receiving and refreshing the options and futures orderbook 11. The orderbook 11 is refreshed on a regular basis based on a pre-set time interval or is refreshed live as soon as changes in bid and/or ask orders are detected, or when new bid and/or ask orders are created or when existing bid and/or ask orders are deleted. Changes in the orderbook 11 according to the said activity after refreshing are transmitted to a quoting module 13 on the processor, which communicates with the updating module 12. The quoting module 12 functions to quote option prices for the ask orders and the bid orders based on market prices when the orderbook 11 is refreshed and information is received from the updating module 12. The option price is quoted based on bid and ask prices 201 from the orderbook, and a bid-ask spread that is established 202 is adjusted based on market activeness or futures liquidity 203, transaction fee 204, market fluctuation 205, equity or margin efficiency 206, profit requirement or target spread 207 of the user, and risk management consideration. When any of the ask order or the bid order is filled by the user through an interface of the system's hardware and software, an ordering module 14 on the processor then communicates with the quoting module 13 and the options and futures orderbooks 11 to submit or withdraw an order on the financial product exchange. The quoting module 13 is configured to withdraw unfilled orders when the updating module 12 refreshes the options and futures orderbook 11, which contain option expiries and option strike prices on a same underlying asset of the financial product. A high level of margin extra fees is set by the user as a benchmark for the order on the exchange to be submitted and withdrawn.

Referring to Fig. 3, Quote Price Adjust 102 decides quote prices depending on market price spread in 201 and risks. Spread Wideness Adjust 202 controls quote prices considering risk factors to make deals profitable. All these risk factors will be quantified and aggregated into extra fees, used to widening our bid-ask spread (added in bid quotes and subtracted from ask quotes). These factors include but are not limited to futures liquidity 203, exchanges transaction fee 204, market fluctuation 205, equity efficiency 206 and target spread 207. Futures Liquidity Adjust 203 accounts for extra fee paid to hedge option Delta. As a market maker, Delta is dynamically hedged using futures, which will be discussed in Dynamic Delta Hedge part later. However, hedge might cost more than option's actual Delta value as tradable prices (bid and ask price) are changing due to liquidity. This risk from futures liquidity is calculated in Futures Liquidity Adjust 203. Transaction Fee Adjust 204 accounts for fee charged from exchanges for making transactions. Fluctuation Buffer Adjust 205 accounts for risk of volatility. Margin Adjust 206 accounts for extra fee due to aggregated margin risk. Higher maintenance margin can increase risk of liquidation. According to the different present margin ratio, there will be several levels of margin extra fees. Higher the margin ratio, higher the extra fee will be. Target Spread Adjust 207 is the final adjustment of extra fee amount. Extra fee aggregate from risk factors above will form a bid-ask spread of quoting prices, which will be compared with market spread in 201, in order to make sure system's quote spread won't deviate from market too much.

After aggregate extra fee is settled, market direction will be included in Funding Fee Adjust 208. Funding fee derives from difference between futures prices and index prices. When funding fee is positive, short perpetuals will gain; when funding fee is negative, long perpetuals will gain. As futures is needed when hedging Delta, there will be an intrinsic long or short direction depending on option type (call or put) and funding fee direction.

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The above process 100 provides sequential instructions including quote prices and sizes to create orders in exchanges through an online platform and there are other safeguards to protect orders, including but not limited to renewing order

prices at a certain time to keep up with the market; making order prices more conservative (higher for bid price and lower for ask price) when the market is volatile; and silencing orders for a period of time after large amounts of transactions.

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According to the second part of this invention as illustrated in Figs. 1, 4 and 6, the system 100 also comprises a risk management mechanism for reducing risks of holding option positions. In the risk management mechanism is a risk analysis module 15 which communicates with the updating module 12 to refresh the options and futures orderbooks 11, and to analyse asset risks from holding option positions. Then, there is a Greek system or a position reducing working control system 501 which communicates with the risk analysis module 15 to define the asset risk. Preferably, the Greek system for the asset risk is Delta risk, Gamma risk, Theta risk, Vega risk, Rega risk, Segal risk, or the likes, in which their corresponding risk shades 103 for reducing risks are Delta risk shade, Gamma risk shade, Theta risk shade, Vega risk shade, Rega risk shade, Segal risk shade, or the likes, which are explained in the “Risk Shade” section below.

Risk Shade

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Referring to Figs. 4–5, the risk shade 103 further comprises one or more first selections 301 and 302 for reducing risks based on option risk exposures, expiries, strikes and holding amounts, and for modifying the quoted option price and the position reduction quote 500 according to the option risk exposure. The flow of the position reduction quote 500 is described further in the following “Position Reduction Quote” section, as illustrated in Fig. 6. Besides, there is one or more second selections 401 for deciding a shade amount and an adjustment amount based on the asset risk, target risk ranges for each risk shade 103 and a risk adjustment speed according to the user’s preference.

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Referring to Fig. 4 and as mentioned in Market Making Quote 100, Risk Shade 103 is used to adjust quote prices. It can also be used in another set of quote instructions Position Reducing Quote 500, which will be described in detail later.

It allows users to adjust quote prices in 102 and 502 in order to control holding positions' risk. User's preference in certain risk exposure ranges will be compared with positions' present risk exposures, then quote price will be adjusted accordingly. These risk exposures include but are not limited to option Greeks (Delta, Gamma, Vega, Rega, Sega, etc.), strike concentration and forward basis, etc. User needs to decide priority over position concentration and Risk Shade in 301. If position concentration comes first, Risk Shade will only be processed on instruments that already have positions. Otherwise, Risk Shade will be processed on all quote orders no matter what instruments they are. Each risk exposure will decide how much ask and bid price will move separately following certain orders and rules in 302. Then these moves will be aggregated and provide a final quote price. However, not all instruments are adjusted equally. This will be decided on their features related to each risk exposure. The option price (ask and bid price) is increased when long the asset reduces the risk exposure according to the first selections 301 and 302, and the option price (ask and bid price) is reduced when short the asset reduces the risk exposure according to the first selections 301 and 302.

Referring to Fig. 5, each risk shade 103 (Delta Shade, Gamma Shade, Vega Shade, Rega Shade, Sega Shade, Strike Shade and Forward Shade) in 302 can be done separately. Each risk shade 103 only works on instruments that are suitable for changing this risk exposure in 401. Delta shade works only on out of money options to avoid too much Delta change at a time; Gamma shade only works on short term instruments out of consideration that long term instruments' Gamma is too small; Vega shade only works on long term instruments out of consideration that short term instruments' Vega is too small; Rega and Sega shade are set related to options' Delta.

Comparing present risk exposure and preferred risk ranges, the system will choose different adjust method in 402. If present risk exposure is higher than user's preferred risk exposure range, quotes shade in short direction. If present risk is lower than user's preferred risk exposure range, quotes shade in long direction. If present risk is in user's preferred risk exposure range, prices move in

direction to decrease margin occupation. When present risk exposure is out of range, the system will adjust risk exposures as aggressively as possible in 403. Market spread will be used to decide price adjustment in 404. Then this price adjustment will be protected by a maximum value as a protection mechanism in 405. When present risk exposure is in the range, price adjustment will be smaller than price adjustment 403. Closer the risk exposure to preferred range threshold, higher the price adjustment will be. Quote prices will change price adjustment amount in 403/406 to facilitate risk exposure back to preferred risk range in 407.

10 Position Reducing Quote

A risk change is done by changing the risk shade 103 of the Greek system, as described in the previous section, and/or by changing a position reduction quote 500 of the position reducing working control system 501 when an option risk exposure is out of a risk exposure range as determined by the risk analysis module 15 according to the user's preference settings 502, 503, as illustrated in Fig. 6. Referring back to Fig. 6, and Fig. 8, the position reduction quote 500 is determined by the position reducing working control system 501 based on the refreshed options and futures orderbooks 11 and the ask order or bid order quoted according to the first selection to change the asset risk, in which the ask order is quoted with an adjustment in step 705 when the risk exposure is lower than preferred ranges, and the bid order is quoted with an adjustment in step 705 when the risk exposure is higher than preferred ranges.

Referring to Fig. 6, besides Market Making Quote, this system gives another set of quote instructions to decrease risk from accumulated positions, which is called Position Reducing Quote 500, using a position reducing working control system 501. Risk shade 103 protects user's positions by adjusting quote prices while Position Reducing Quote 500 protects user's positions by adding new quotes where prices are decided in 502. Position Reducing Quote sizes in 503 are decided by user's demand and strike concentration. The higher the positions' amount on single strike, the higher quote sizes will be while sizes are capped by max order size and floored by min order size. As in Risk Shade 103, whether a

user has too many positions is measured by risk exposures.

Referring to Fig. 7, Position Reducing Quote only works when there are too many risk exposures or by user's command in 601. If user wants no position on one
 5 expiration, Position Reducing Quote continues to work until there is no position. Otherwise, present risk exposures will be checked, including Gamma exposure and Vega exposure in 602. If either of these two exposures are not in user's preferred exposure ranges, Position Reducing Quote will work. However, under the same consideration as Risk Shade 103, short term options won't consider
 10 Vega exposure and long-term options will not consider Gamma exposure.

Referring to Fig. 8, Position Reducing Quote prices are based on bid and ask prices in 701 and adjusted by margin ratio in 702. As higher margin ratio will have higher risk of liquidation, quote prices should be more aggressive in order to
 15 reduce positions faster. This method divides margin ratios into several levels, at each level quote prices have different percentages step relative to effective market spread in 703. Higher the margin ratio, higher the percentage step. Also, this step is capped by an absolute maximum move in 704. When exposure is higher than preferred exposure ranges, Position Reducing Quote gives bid
 20 quotes adjusted by the step in 705. When exposure is lower than preferred exposure ranges, Position Reducing Quote gives ask quotes adjusted by the step in 705. After that, Risk Shade 103 will also be applied on Position Reducing Quote to adjust prices, under the same logic as Market Making Quote. Besides, Position Reducing Quote has other protections, such as a safeguard mechanism 16 as
 25 illustrated in Fig. 1. The safeguard mechanism 16 suspends quoting or modifying the option price when the asset risk is high as determined based on a high price fluctuation, a high margin cost, a low number of market participants and a high transaction frequency. Suspension may also be performed when the quoted option price is determined to be wrong based on a large discrepancy between
 30 the quoted price and a market mid-price, a delay in refreshing the options and futures orderbook 11, wrong data is received, or any combination thereof. For example, Position Reducing Quote is suspended if there isn't enough effective book spread.

Dynamic Delta Hedge

According to the third part of the present invention as illustrated in Fig. 9, the risk management mechanism reduces the Delta risk using a Dynamic Delta Hedge (DDH) 800 when a large Delta risk is determined by the risk analysis module 15, in such a way that the Delta risk is reduced by buying and selling futures. Dynamic Delta Hedge is the third set of quote instructions used to control Delta exposure. Delta hedge is a common need for many option traders by buying and selling futures continuously. Optimal situation would be maintaining Delta as zero constantly, which is impossible, so users need to set a tolerance range around zero. The smaller tolerance range is, the more frequency Delta hedge would be done at a cost of more transaction fees. This Dynamic Delta Hedge process 800 is configured to balance between cost and time efficiency of the Delta hedge. In user's tolerable hedging time, delta hedge will be completed at fewest cost.

Referring back to Fig. 9, DDH works in two situations in 801. The first is that present Delta exposure is out of user's preferred Delta range. Dynamic Delta Hedge will work until Delta is in tolerance range in 802. The second is that new transaction from Market Making Quote or Position Reducing Quote has Delta exposure larger than certain limits. Under this situation, Dynamic Delta Hedge will work to fully hedge this transaction's Delta. When present Delta exposure is higher than user's preferred Delta range or new transaction's Delta is positive, Dynamic Delta Hedge will sell futures to hedge. When present Delta exposure is lower than user's preferred Delta range or new transaction's Delta is negative, Dynamic Delta Hedge will buy futures to hedge. At what prices to sell or buy futures is decided by 803, in which large Delta risk can be caused by present Delta's change or large size of new transaction.

Referring to Fig. 10, when Dynamic Delta Hedge is working, orders are placed sequentially at an interval of cooling time and unfilled orders will be cancelled after a given time. Order prices are set according to hedge time. Longer the hedge time, the more dangerous user's Delta exposure will be, so order prices

will be more aggressive. To start with, quote prices will be set as maker orders in 902 and linearly move into take orders in a given time in 903. When buying futures, order prices will start at best bid and increase to best ask. When selling futures, order prices will start at best ask and decrease to best bid. Order sizes are
5 decided by percentage related to user's preferred Delta range, capped at an absolute size.

The present invention achieves several technical advantages in that it realizes a low-latency collection of market streaming data, which can transmit into a cross-
10 sectional data engine and synchronously update the price changes of exchanges' derivatives within milliseconds. Data types include but are not limited to the orderbook, volatility, transaction data and other market data, etc. Besides, a set of stochastic volatility models is built based on online learning. This model is continuously updated based on the orderbook data updated in real-time from top
15 exchanges, providing support for quotes and risk factor calculations. The present invention also visualizes the profit and loss (PnL) of an account attributed to different risk exposures; prediction of future PnL based on risk scenarios; and market data including vol surface, forward curve, etc. Finally, a complete position management system and a quotation adjustment system is established. Passive
20 adjustments include calculating risk indicators such as Gamma/Vega/Rega/Sega and adjusting the prices of bids and asking to realize risk preferences in different dimensions. Active adjustment is a set of visualized front-end sections that can display and adjust all system parameters.

25 As described above, the working systems in this invention include Market Making Quote, Risk Shade, Position Reducing Quote, and Dynamic Delta Hedge. These systems can be used separately or combined depending on user's demand. One or several uses of these systems should be seen as an application of this system. In the examples described above, for purposes of explanation and non-limitation,
30 specific details are set forth, such as particular risk factors, Delta hedge price changing ranges, etc. in order to provide an understanding of the described technology. It will be apparent to one skilled in the art to apply apart from the specific described details.

While the subject matter of this document has been described in crypto option market, it is to be understood that the subject matter described in this document is applicable in the context of any other appropriate markets, including but not limited to other option markets and/or stock markets in financial product exchanges.

The present invention may be embodied in other specific forms without departing from its essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore indicated by the appended claims rather than by the foregoing description. All changes, which come within the meaning and range of equivalency of the claims, are to be embraced within their scope.

CLAIMS

1. A system for quoting option prices in option market making (100), comprising:
 - 5 one or more options and futures orderbooks (11) on a processor having one or more ask orders and bid orders of a selected option contract in a financial product exchange;
 - an updating module (12) on the processor which communicates with the options and futures orderbooks for receiving and refreshing the options and futures
 - 10 orderbook (11);
 - a quoting module (13) on the processor which communicates with the updating module (12) for quoting option prices for the ask orders and the bid orders based on market prices when the orderbook (11) is refreshed; and
 - an ordering module (14) on the processor which communicates with the quoting
 - 15 module (13) and the options and futures orderbooks (11) for submitting or withdrawing an order on the exchange when the ask order or the bid order is filled,
 - characterized in that the selected option contract is selected based one or more strike prices and options expiries as determined by a user, and the quoting module (13) is configured to withdraw unfilled orders when the updating module (12)
 - 20 refreshes the options and futures orderbook (11), option expiries and option strike prices on a same underlying asset, wherein the order on the exchange is submitted and withdrawn at a high level of margin extra fees set by the user.
2. The system for quoting option prices in option market making (100)
 - 25 according to claim 1, wherein the option price is quoted based on bid and ask prices (201) from the orderbook, and a bid-ask spread (202) is adjusted based on market activeness or futures liquidity (203), transaction fee (204), market fluctuation (205), equity or margin efficiency (206), profit requirement or target spread (207) of the user, and risk management consideration.
3. The system for quoting option prices in option market making (100)
 - 30 according to claim 1, wherein the system (100) further comprising a risk management mechanism for reducing risks of holding option positions, having:
 - a risk analysis module (15) which communicates with the updating module (12)

for refreshing the options and futures orderbooks (11), and for analyzing asset risks from holding option positions; and

a Greek system or a position reducing working control system (501) which communicates with the risk analysis module (15) for defining the asset risk.

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4. The system for quoting option prices in option market making (100) according to claim 3, wherein the Greek system for the asset risk is Delta risk, Gamma risk, Theta risk, Vega risk, Rega risk, Sega risk, or the likes, in which their corresponding risk shades (103) for reducing risks are Delta risk shade, Gamma risk shade, Theta risk shade, Vega risk shade, Rega risk shade, Sega risk shade, or the likes.

5. The system for quoting option prices in option market making (100) according to claim 4, wherein a risk change is done by changing the risk shade (103) of the Greek system or by changing a position reduction quote (500) of the position reducing working control system (501) when an option risk exposure is out of a risk exposure range as determined by the risk analysis module (15) according to the user's preference settings (502, 503).

6. The system for quoting option prices in option market making (100) according to claim 5, wherein the risk shade (103) further comprises:

one or more first selections (301, 302) for reducing risks based on option risk exposures, expiries, strikes and holding amounts, and for modifying the quoted option price and the position reduction quote (500) according to the option risk exposure; and

one or more second selections (401) for deciding a shade amount and an adjustment amount based on the asset risk, target risk ranges for each risk shade (103) and a risk adjustment speed according to the user's preference.

7. The system for quoting option prices in option market making (100) according to claim 6, wherein bid and ask prices are increased when long the asset reduces the risk exposure according to the first selections (301, 302); and bid and ask prices are decreased when short the asset reduces the risk exposure, according to the first selections (301, 302).

8. The system for quoting option prices in option market making (100) according to claim 6, wherein the position reduction quote (500) is determined by the position reducing working control system (501) based on the refreshed options and futures orderbooks (11) and the ask order or bid order quoted according to the first selection to change the asset risk, in which the ask order is quoted with an adjustment when the risk exposure is lower than preferred ranges, and the bid order is quoted with an adjustment when the risk exposure is higher than preferred ranges.

9. The system for quoting option prices in option market making (100) according to claim 4, wherein the risk management mechanism reduces the Delta risk using a dynamic Delta hedge (800) when a large Delta risk is determined by the risk analysis module (15), in such a way that the Delta risk is reduced by buying and selling futures.

10. The system for quoting option prices in option market making (100) according to claim 9, wherein the dynamic Delta hedge (800) is configured to balance between a cost and a time efficiency of the Delta hedge (800).

11. The system for quoting option prices in option market making (100) according to claim 1, further comprising a safeguard mechanism (16) for suspending quoting or modifying the option price when the asset risk is high as determined based on a high price fluctuation, a high margin cost, a low number of market participants and a high transaction frequency, or when the quoted option price is determined to be wrong based on a large discrepancy between the quoted price and a market mid-price, a delay in refreshing the options and futures orderbook (11), wrong data is received, or any combination thereof.