METHOD AND SYSTEM FOR OPERATING AN ELECTRONIC EXCHANGE

FIELD OF THE INVENTION

The present invention relates to a method and system for managing or operating an exchange. In particular, the present invention relates to a method and system for managing or operating an exchange, such as an exchange linked to an index variable, to mitigate the credit risk to the exchange.

BACKGROUND OF THE INVENTION

Electronic exchanges, especially those that allow users to access an exchange remotely over a network such as the internet, are rapidly gaining acceptance. Factors such as the increased reliability and perceived suitability of the internet for financial transactions, the continuing growth in the global investment industry, the recent spectacular losses posted by hedge funds, and the resulting resurgence of index-linked funds and self administered investments, have all contributed to the need for electronic exchanges that permit investors to invest and/or speculate on various financial variables.

The internet is maturing to the point where the financial professionals and the general public are becoming comfortable sending sensitive data via the world wide web. Current industry standards in web security are sufficient to make this confidence justified. Strong encryption technology (128 bit keys or higher) is now readily available. This high level of security, coupled with the high accessibility and global reach of the internet, are already prompting an explosion in eCommerce, eTrading and eBrokerage.

Continuing the trend of the last decade, the global mutual fund business is continuing to grow at an accelerating rate. Given the demographics of the industrialized nations, there will likely continue to be a net influx of funds for retirement investment accounts globally. Overall, many of the professionally managed funds do not consistently earn better rates of return than the broadly based equity indices against which they are benchmarked. The investing public is becoming increasingly resentful of significant management fees in cases where the managed fund fails to outperform the benchmark. Recent dramatic losses by various hedge funds have served to underscore the fact that professional management does not guarantee protection of principal.

For all of these reasons, an alternative mechanism by which a retail investor can obtain cost-effective exposure to the major equity indices is desirable. Index futures contracts, where available, partially address this need, but have significant disadvantages. The forward settle of the contracts (hence the name "future") means that there are many contracts trading for a given index, each with a different expiry. An investor wishing to maintain a long-term position must continually roll into the next contract as the front contract expires, which can be a confusing requirement for many investors. In addition, index

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future contracts are sized to be appropriate for institutional investors, and are thus much too large for retail investors.

The electronic trading revolution that has recently received attention has only scratched the surface with respect to the improvements that are possible. All of the innovations to date, from electronic trading of financial futures, such as Globex™, to retail electronic brokerage, such as E*Trade™, have merely automated well known trading systems, and have not done anything to mitigate or eliminate credit risk. In other words, it is still possible for a party to suffer catastrophic losses, and for such losses to have a knock-on effect.

The conventional approach to mitigating risk at the institutional level is generally based on a pledge of securities or simple confidence in the financial viability of the investor. Such a method works reasonably well in most circumstances, but on occasion, such as the collapse of Barings Bank or the multi-billion dollar Long Term Capital Management bailout, it can fail spectacularly. On the retail side, a determination of credit risk requires an inefficient and costly process of assessing a client's credit that must be completed to ensure that the investor can cover potential losses if short or margined positions are to be allowed. Even so, the broker is dealing with probabilities rather than certainties.

It is therefore desirable to provide an electronic exchange, and a method of operating such an exchange that limits or mitigates the credit risk or exposure of the exchange, while permitting investors to trade and otherwise manage their investments in a simple and intuitive fashion.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method and system for operating an electronic exchange that obviates or mitigates at least one disadvantage past systems and methods. In particular, it is an object of the present invention to provide a method and system for operating or managing an electronic exchange that mitigates credit risk for the exchange.

In a first aspect, the present invention provides a method for operating an electronic exchange for a market having a periodically fixed value, such as shares of individual companies, interest rates, foreign exchange rates, financial indexes, commodity prices, or weather parameters. The exchange sets a maximum market swing value, effectively a maximum daily limit for movement of the market either up or down, and determines an opening market value based on the actual market. The electronic exchange has a plurality of clients, and each client has a margin account and a position in the market. The position held by the client can be short, long or nil. The method begins with receiving an order from a client. The order includes a size, and price or amount. The order is confirmed if the client's margin account is at least equal to a a potential position that would result if the order were filled times the

maximum market swing value times a threshold value factor. If the client's margin account contains less than this value, the order is rejected or adjusted. Once confirmed, the order is posted to the exchange, where it can be matched with countervailing orders from other clients. If a trade is made, the client's position is set to an actual position resulting from the trade, and the process is repeated for each order submitted by the client in a given trading period. Each trade that is partially or fully filled also causes the client's margin account to be adjusted. In a presently preferred embodiment, the threshold value factor is set to two, which limits the exchange's potential losses to the amount held by the exchange in the client's margin account.

At the end of the trading period, generally a daily trading period, the market is closed to incoming orders, and a closing market value is determined. In most cases, the closing market value will be within the maximum market swing value, and the client's margin account is marked to market by an amount equal to the difference between a closing market value and the opening market value times the client's currently held position.

In the unusual case where the market closes outside the maximum market swing value, the method of the present invention limits the closing market price to the opening market price plus or minus the maximum market swing value, as appropriate. The client's margin account is then adjusted at this artificial closing price as detailed above, and all client positions on the exchange are closed out.

In a further aspect, the present invention provides a method for automatically reducing a client's position in the market if, at the end of a trading period, the client's margin account is not at least equal to the client's position times the maximum market swing value times a threshold value factor. In this case, the client's position is reduced by generating a trade, or trades, at a trade value, which in a worst case is the closing market value plus or minus the maximum market swing value. The client's margin account is adjusted in response to the trades. In a worst case, the client's position can be reduced to nil.

In a presently preferred embodiment, all withdrawals from the margin account requested by the client are first confirmed against the current balance, the existing position of the client, and the unfilled orders that are currently in the market. In the case where the client has a nil position and no unfilled orders in the market, the entire current margin balance can be withdrawn by the client.

According to a further aspect of the present invention, there is provided an electronic exchange system for an electronic exchange having a predetermined maximum market swing value. The system consists of a processor unit with means to connect to a network, and a mass storage device for storing and retrieving client information including a client position and a client margin account balance. The exchange engine further includes an exchange engine for receiving and processing orders from a client, an end-of-day engine for marking the margin account to market; and an auto-reduction engine for

automatically reducing a client's position if the client's margin account is less than the client's position times the maximum market swing value times the threshold value factor.

A further aspect of the present invention provides an electronic exchange for mitigating risk in a market having a periodically fixed value. The exchange has a predetermined maximum market swing value, and a closing market value limited by the maximum market swing value. An opening market value for the exchange is determined by the periodically fixed value at an end of a previous trading period.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the attached Figures, wherein:

Figure 1 is a flow chart of a method for posting orders according to the present invention;

Figure 2 is a flow chart of a method for marking to market according to the present invention;

Figure 3 is a continuation of the flow chart of Fig.2, showing a method for position auto-reduction according to the present invention;

Figure 4 is a continuation of the flow chart of Fig. 2, showing a method for closing out client positions when the market close exceeds a predetermined level; and

Figure 5 is a block diagram of a system for operating an electronic exchange according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is generally directed to an electronic exchange for dealing, investing or speculating on the movement of any market having a periodically fixed value, such as stock indexes, shares in individual companies, interest rates, foreign exchange rates, financial indexes, commodity prices, and weather parameters. Essentially, the present invention provides a electronic futures exchange that limits the risk, or exposure, of the exchange and the participants in the exchange, to the amount of money deposited in margin accounts for each client. As in any futures exchange, clients hold long and short positions that net to zero, and the losses and gains associated with these positions also net to zero. As is understood by those of skill in the art, commissions payable to the exchange can also be charged on each transaction. Generally, commissions are charged either as a percentage of the value of the transaction, or as a flat fee.

The electronic exchange of the present invention is operated with certain minimum constraints on the market and participants. First, there must be a session-to-session price change limit, referred to herein as a maximum market swing value. This maximum market swing value an arbitrarily chosen value

that limits the amount by which the market is permitted to move in a single trading period. The maximum market swing value is typically determined by the exchange administrator to be large enough to reflect normal market movement, and will only be exceeded in exceptional circumstances, such as a market collapse.

In the event that market movement exceeds the preset maximum market movement value, a closing price for the market is deemed to be a limited price, which is the opening price plus or minus the maximum market movement value, as appropriate. When such a situation occurs, the clients of the electronic exchange will all have their positions closed out at the limited price. The opening price for the next market session is the unlimited, or actual, closing price from the previous session, and all participants start with flat, or nil, positions. The limited price referred to herein is not necessarily the same as the "limit price" at which trading is suspended in an actual market.

Under a further exchange constraint, every participant or client in a losing position who does not maintain a margin account at minimum required levels, is subject to an automatic position reduction, referred to herein is an auto-reduction. Auto-reduction reduces or closes the client's position at the best available price. If no price is available through counterparties, the auto-reduction mechanism creates an order at the limited price, which produces the greatest possible loss to the client. Conversely, every client with a gaining position accepts it may have its position automatically reduced or closed out at the limited price that produces the greatest possible profit, if one or more other counterparties with losing positions do not maintain their margin at the required levels.

To establish an electronic exchange according to the present invention, a market having an underlying, periodically fixed, variable is chosen. An exchange administrator then permits clients to register to trade on the exchange against the value of the chosen market. In a presently preferred embodiment, the electronic exchange of the present invention is provided to clients over the internet, or other suitable network, and all registration and trading activities are performed via an appropriate electronic digital communication device, such as a computer having a modem. Client registration generally involves providing identification information, credit information, and accepting the particular rules and constraints of the market, including, where appropriate, disclosure of risks in compliance with securities and related regulations. Once registered, the client must open a margin, or deposit, account, and must maintain a balance therein in order to participate in the market.

Figs. 1 to 4 generally illustrate the method of operating an electronic exchange according to the present invention. Referring to Fig. 1, at step **100**, the maximum market swing value F_S is set. As mentioned above, this step is normally performed by the exchange administrator, and can be based on historical or other market movement data and indicators. Typically, step**100** is not performed daily, but

rather, is set at the founding of the exchange and adjusted only when it is empirically apparent that the value is too high or too low.

The method then proceeds to step **102**, where the opening market value F_O, or opening price, is determined. Step **102** is performed at the beginning of each trading period, which for most markets is daily, and is generally the closing price of the previous trading period.

The method now proceeds to the receipt of an order from a registered client of the exchange at step **104**. An order consists of an offer or bid of a certain size (i.e. for a number of units, or contracts), at the ask or bid price at which the client wishes to effect a trade. At step **106**, the exchange determines the client's potential position P_O, that could result if the order is accepted. The size of the order determines a potential order position P_O, either long or short, respectively, depending on whether the order is an offer to sell or a bid to buy. Potential order position P_O is the client's present position P, plus the size of the order request. If the order is filled, that is, if a counterparty has an opposite order pending on the exchange and a trade is made, the potential order position P_O becomes the client's actual position P. As will be apparent to those of skill in the art, orders can also be partially filled, in which case the client's actual position P after any given trade is determined by the actual size of the trade. By convention, a short position is a negative value and a long position is a positive value.

The client has a margin account M that contains funds on deposit, adjusted for day trades, as is further described below. Margin account M is checked at step **108** to ensure that the client has sufficient money on deposit to cover the worst case scenario for the market. In order for the order to be confirmed at step **110**, margin M must be greater than, or equal to, the absolute value the client's potential position P_O times the maximum market swing value F_S times a threshold value factor Q, plus a constant:

$$M \geq |P_O * F_S * Q| + C$$

In a presently preferred embodiment, Q equals two, which effectively means that a client can incur maximum losses in two successive trading periods before the margin account is fully depleted. If Q is greater than two, the exchange has an even greater cushion of security. If Q is set at less than two, the exchange's risk is not fully mitigated, and a client's margin account may not have sufficient funds on deposit to cover maximum potential losses. The value of C is typically set to zero. However, if, for example, the exchange desires to extend a line of credit to a client, C can be set to a negative number equal to the amount of the line of credit. Conversely, if the exchange, or a client, wishes to limit the potential losses to less than the full value of the client's margin account, C can be set to a positive value that provides such a cushion. If the client's margin meets the condition at step**108**, the order is confirmed at step **110** and posted to the exchange at step **112**.

Posting the order permits trades to occur with available counterparties who post appropriate

countervailing orders to the exchange in a similar manner. When a trade between counterparties occurs, each counterparty's margin account is credited or debited by an amount corresponding to the difference between the trade price and the opening price times the size of the trade, in a manner similar to conventional futures exchanges. The counterparties' overall positions are then adjusted in accordance with the size of the trade. For example, when one counterparty has a confirmed offer on the exchange at a given ask price, and a counterparty has an accepted bid in the market at a given bid price, and the price equals or exceeds the ask price, then a trade occurs and offsetting positions are established for both parties. If the sizes of the offer and bid are equal the orders are filled and drop from the market. If the offer and bid are of unequal size, the smaller order is filled, and the larger order is reduced accordingly.

If the condition at step **108** is not met, the order is rejected, or adjusted, at steps **114a** or **114b**, respectively. Rejection of the order at step **114a** results in the transmission of an electronic message to the client informing them of the rejection, and the required margin necessary to be deposited to the client's margin account to effect the desired order. If the client subsequently deposits the necessary funds to the margin account, the order can be resubmitted. Alternatively, if the exchange is enabled to adjust orders as shown at step **114b**, the size of the order is adjusted until the condition at step **108** is satisfied. Again, an electronic message can be sent to the client notifying them of the adjustment. In a presently preferred embodiment, the client can be given the option of either having the trade rejected, or having the size of the trade adjusted.

Referring to Figs. 2 - 4, typical end-of-day procedures according to the present invention are illustrated. At the end of each trading session, the exchange is first closed, at step **200**, to incoming orders and other transactions. The closing market value F_T is then determined at step **202**. In a presently preferred embodiment, the closing value is determined by direct reference to an external index, price or other parameter. Alternatively, the closing value can be based on trading levels in the last few minutes of trading, as is currently the case with most futures exchanges. As shown at step **202**, the difference between the closing market value F_T and the opening market value F_O is compared to the maximum market swing value F_S. If

$$|F_T - F_O| \leq F_S$$

the end-of-day procedure continues to step **204**. If the above condition is not met, i.e. if the market movement during the trading period exceeds the limit set by the administrator, the method proceeds to step **206** and moves to the procedure outlined in Fig. 4, as is described in further detail below.

If the condition at step **204** is satisfied, an auto-reduction list maintained by the exchange is checked at step **208** to determine if any client's account are subject to auto-reduction. If the answer is in the affirmative, the method of the present invention proceeds to step **210** and moves to the auto-reduction

procedure outlined in Fig. 3, as is also described in greater detail below. If no auto-reductions are required, the method proceeds to step **212** where all pending (i.e. confirmed but not filled) orders on the exchange board are cancelled.

The end of day balances for each client are then calculated at step **214**. and the margin accounts for each client are adjusted to reflect the profit or loss on the day. This is termed marking to market, as is well known to those of skill in the art. Each client's margin account is adjusted by an amount equal to the position currently held by the client times the difference between the closing and opening market prices:

$$M = M + (F_T - F_O) * P$$

This adjusted margin is then examined at step **216** to ensure that the client has sufficient remaining minimum funds on deposit to satisfy the general exchange constraint:

$$M \geq |P * F_S * Q| + C$$

If this constraint is not satisfied, the client is placed on the auto-reduction list at step**218**. The client is then notified and has the opportunity in the next trading period to add additional funds to its margin account to raise it to the required minimum margin level, or, failing this, the client's account will undergo auto-reduction. Following either step **216** or **218**, as appropriate, the client's resulting position and margin balance are then set, at step **220**, for the following trading period.

Referring to Fig. 3, the auto-reduction method of the present invention is illustrated. A client's account undergoes auto-reduction when its margin account is insufficient to cover its current position in the market in two successive trading periods, according to the constraints above. At step **300**, the exchange creates an order for the client at for a number of units at least equal to:

$$(M - P * F_S * Q)/F_S$$

at the limit price $F_O \pm F_S$. If the client currently has a short position, the limit price is $F_O + F_S$. Conversely, if the client is currently long, the limit price is $F_O - F_S$. This automatically created order is posted to the exchange at step **302**, and the order is processed against available offers by counterparties on the exchange. As will be apparent from the discussion of Fig. 2, where the auto-reduction procedure is invoked, all counterparties' outstanding unfilled orders are held on the exchange board until any required auto-reductions are completed, and are then cancelled. Each trade generates a profit/loss to the client's margin account, as detailed above. If, after the possible trades between counterparties have been exhausted, the order is filled at step **306**, the auto-reduction ends and the client's remaining position and margin balance are set for the following trading period.

If, at step **306**, the order has not been completely filled, the exchange generates a counter-order at the limit price large enough to fill the order, as shown at step **310**. This counter order is processed as

usual, and the profits (losses) are credited (debited) to each participant in the market in accordance with their respective positions. It is not expected that this step will be required in most instances, as there will normally be sufficient available orders pending on the exchange at closing to handle required auto-reductions.

Fig. 4 illustrates the procedure followed when the change in market value over a trading period is greater than the maximum market swing value. If such a condition is detected at step **206**, the closing market value F_T is set to:

$$F_T = F_O \pm F_S$$

at step **400**. Each client's margin account is adjusted to reflect the profit (loss) on the day at this F_T and the client's position is closed out to a nil position, as show at steps **402** and **404**. This means that no client can suffer a loss greater than the amount held on margin, but also means that clients in gaining positions have a limit set on their potential gains in a very volatile market.

As will be understood by those of skill in the art, in order to preserve the risk mitigation that is the object of the present invention, there must also be limits on the amount that a client can withdraw from its margin account in any trading period. Essentially, without reversing posted orders, a client's maximum withdrawal is the limited to the amount that would remain in the account if its total current position was hit or lifted at the most disadvantageous price to the client. If the client has a nil position and has no orders outstanding, the total amount of its margin account can be withdrawn.

The following are two examples of an exchange operating according to the method of the present invention. The market is established on a publicly quoted financial index X with an initial value of 100. The market is fixed daily. The maximum market swing value is set at 10.
Below is a table that sets out the opening and closing values for a period of five days:

Day	opening value	closing value
0	N/A	N/A
1	100	104
2	104	114
3	114	110
4	110	120
5	122	131

In a first example, at the beginning of Day 3, a client A has a long position of 10, i.e., the client makes $10 for each unit the index increases, and a margin account with a balance of $500. "A" does not

trade during day 3. At the end of Day 3, "A" has lost $40, and the margin account is adjusted to $460. "A" begins Day 4 with a position of long 10, and sells 5 units at a price of 115 during the day. "A" makes $25 (5 * (115 - 110)) immediately, but his effective position has been reduced to 5. At the end of Day 4, the actual closing market value is 122. This closing price exceeds the opening value plus the maximum market swing value of which is 120, so the method illustrated in Fig. 4 is invoked: "A" has his position closed out at a price of 120, which generates a profit of $50 (5 * (120-110)). Thus during Day 4, "A" has made a total of $75. At the open of Day 5, "A" has no position, and neither does anyone else participating in the exchange.

In a second example, at the beginning of Day 2, client B is short 12, and has the bare minimum margin posted to cover this position (|(-12) * 10 * 2| = $240). "B" tries to post offers, but finds that the system will not allow him to do so unless he first deposits more margin. "B" could post bids to cover his short position, but chooses not to do so. At the close of Day 2, "B's" margin account is adjusted to reflect the $120 loss he incurs (M = 240 + (-12) * (114-104) = $120). At the open of Day 3, "B" has margin of $120, and is still short 12. "B" must reduce his position by 12, i.e. buy 12, or deposit $120, or some combination of the two. Assuming "B" does nothing, and there are no offers available, the auto-reduction mechanism posts a limit up bid for "B" and generate limit up offers for other participants weighted by the size of their long positions. The resulting trades will eliminate the position that "B" has, and consume the rest of his $120 margin to do it. In an even minimally active market, there would almost certainly be offers at prices less than the upper limit, and so "B" would have his position completely closed out, but retain a portion of his margin.

Fig. 5 depicts a presently preferred embodiment of an electronic exchange system **500** for implementing the above-described method. Exchange **500** is preferably attached to the internet **501**, as illustrated, or to another network providing means for electronic communication between clients **A** and **B** and exchange **500**. Only two clients are shown attached to internet **501**, however, as will understood by those of skill in the art numerous clients can be attached at any one time, depending on the bandwidth of the network. In a presently preferred embodiment, exchange **500**, internet **501**, and clients **A** and **B** are all capable of sending, transmitting and/or routing data suitably encrypted with 128-bit encryption or better. Each client will generally consist of a general purpose computer, such as an IBM-PC compatible computer having standard components (not illustrated) such as a central processor, a main memory, such as conventional random access memory (RAM), an input/output controller, a keyboard, a pointing device, such as a mouse, track ball, track pad, pen device or the like, a display or screen device, a mass storage device, such as a hard drive, floppy drive, optical disk, flash memory or the like, and a network interface card or controller, such as an Ethernet card, and a modem. Clients communicate with other systems via

the modem. A variety of optional input/output devices can also be attached to a client, including printers, slide output devices, plotters, etc.

A conventional computer application software system (not illustrated) is generally provided for directing the operation of each client. The software system is stored in memory, and/or on the mass storage device. Software system generally includes a kernel or operating system (OS), and a windows shell. The OS and windows shell can, for example, be provided by Microsoft® Windows 98, Microsoft® Windows NT, IBM OS/2®, Macintosh® OS, Linux®, or other similar application. One or more application programs, such as client application software, can be loaded for execution by the client. In a presently preferred embodiment, client application software includes a Web browser, such as Microsoft Internet Explorer™ or Netscape Navigator™ browser software that communicates with the internet **501** through a communication layer or driver, such as a Winsock driver, and can support at least 128-bit encryption. Software system further includes a user interface, preferably a graphical user interface (GUI), for receiving and displaying user inputs, commands, and data and outputs resulting from operation of the operating system and application programs.

Exchange **500** generally consists of a processor unit **502**, a mass storage device **504**, an exchange engine **506**, an end-of-day engine **508** and an auto-reduction engine **510**. Processor unit **502** is typically embodied on one or more general purpose computers, configured as described above, operating as stand-alone machines or interconnected on a LAN. Processor unit **502** can also function as an internet server, or can interface with such a server (not shown) in order to host exchange **500** on internet **501**. Mass storage unit **504** can be any suitable device capable of storing and retrieving client positions and margin account balances. Exchange engine **506**, end-of-day engine **508** and auto-reduction engine **510** are virtual processing units provided embodied in application software executing on processor unit **502**. The engines operate according to the method described above. In particular, exchange engine **506** performs the functions described in Fig. 1, end-of-day engine **508** performs the functions described in Figs. 2 and 4, and auto-reduction engine **510** performs the functions described in Fig. 3.

To further illustrate the method and system of the present invention, charts are provided in Appendices A and B. Appendix A provides a summary of the end of day procedures discussed above. Appendix B provides a Microsoft Excel® implementation of intra-day order/withdrawal confirmation formulas for the present invention.

As will be apparent to those of skill in the art, the present invention provides a method for operating an electronic exchange based on a underlying market variable that effectively eliminates credit risk, and a system for implementing the method. The variable underlying the exchange can be literally anything that has a periodically fixed value, from shares of individual companies, to interest rates, to

foreign exchange rates, to financial indexes. The resulting market will operate in a fair, orderly, transparent way for all participants, regardless of their size. The constraints in the method accommodate market "gaps", i.e. changes in the underlying market value that are greater than a preset limit, and limit a participant's losses to the funds held on deposit in a margin account.

The above-described embodiments of the invention are intended to be examples of the present invention. Alterations, modifications and variations may be effected the particular embodiments by those of skill in the art, without departing from the scope of the invention which is defined solely by the claims appended hereto.

APPENDIX A

End of Day Procedure

Summary

1) Close market to incoming orders and transfers
2) Automatically reduce positions
3) Cancel all orders on the board and in the pending queue
4) Calculate end-of-day balances
5) Set opening price for next market day
6) Set client balances and positions for start of new day

Details

1. Close market to incoming orders and transfers
1.1. wait until all pending transactions and orders for the market have been processed
1.2. leave any posted orders in the order table; posted orders will be used during auto-reduction, if possible

2. Automatically reduce positions
2.1. For each client with a position in given market
2.1.1. calculate hard available balance at current opening price
2.1.2. if h.a.b.<0 add client to position-reduction list
2.2 For each client in the position-reduction list
2.2.1. create an order at the limit price (limit-up for short positions, limit-down for long positions) of x + 1 units, where x = h.a.b./daily-limit
2.2.2. total-orders = total-orders + (x + 1)
2.2.3. post the order to the pending queue
2.3 For each client with an opposite position in the market
2.3.1 calculate portion = client's position/open interest
2.3.2 create an order at the limit price whose size is total-orders* portion
2.3.3 post order to pending queue
2.4 wait until all pending orders for the market have been processed

3. Cancel all remaining orders in the order table

Note: orders created in 2.3 may be left unfilled if orders created in 2.2 were filled with existing orders

4. Calculate end-of-day balances

4.1. calculate and record the end of day balances by calculating current balance using the closing price

5. Set opening price for next market day

5.1. if [previous-open – previous-close] <= daily-limit

5.1.1. open = previous-close

5.2. else

5.2.1. open = limit-up/down

6. Set client balances and positions for start of new day

6.1. for each client with a position in the market

6.1.1 opening-balance = previous-closing-balance

6.1.2 if [previous-open – previous-close] <= daily-limit

6.1.2.1. opening-position = previous-closing-position

6.1.3. else

6.1.3.1. opening position = 0

APPENDIX B

	B	C	D
2	Current Order Input		
3	pending order price	9750	price submitted by client
4	pending order size	10	Size submitted by client, <0 is offer, >0 is bid
5			
6	Opening Client Parameters		
7	Opening position	30	<0 is short, > 0 is long, 0 is flat
8	Opening balance	10000	Can never be <0
9			
10	Market Parameters		
11	MPLRT	0.5	Factor used to ensure system works
12	Limit	250	Maximum change in price from open to close
13	Opening price	10000	Is the closing price from the previous close, without applying limits
14	Commission rate	0	Transaction charge, effectively increases price paid, and decreases price received
15			
16	Balance Calculations		
17	Current position	=SUM(C7,F12:F16)	Opening position plus net position of day trades
18	Current balance	=SUM(C8,G12:G16)	Opening balance plus net p&I effect of day trades
19	MPL	=ABS(C17*C12/C11)	Current position * limit/MPLRT
20	Hard avail balance	=C18-C19	Current balance less MPL, cannot become negative intraday, if negative at beginning of day Auto Reduction will apply
21	Soft avail balance	=MIN(C20,C27,C34)	Maximum size of withdrawal allowed, without cancelling posted orders
22			
23	Bid calculations		
24	Wtd avg bid price	=IF(C25=0,0,SUMPRODUCT (G4:G8,E4:E8)/C25+C14)	Average bid price, weighted by size plus commission rate
25	Total bid size	=SUM(G4:G8)	Sum of bid sizes for the client
26	Hit all p & I	=C25*(C13-C24)	P&I if all bids are traded
27	Avail if hit	=C18+C26-ABS(C17+C25)/C11*C12	What the hard available balance would be if all bids are traded
28	Max bid size	=MAX(0,(C11*(C18+C26)/C12-(C17+C25))/(1-(C13-C38-C14)*C11/C12))	The largest (most positive) bid size for the given price that is allowed
29			

	B	C	D
30	Ask Calculations		
31	Wtd avg ask price	=IF(C32=0,0,SUMPRODUCT (H4:H8,E4:E8)/C32-C14)	Average ask price, weighted by size less commission rate
32	Total ask size	=SUM(H4:H8)	Sum of ask sizes for the client
33	Lift all p & I	=C32*(C13-C31)	P&I if all asks are traded
34	Avail if lifted	=C18+C33-ABS(C17+C32)/C11*C12	What the hard available balance would be if all asks are traded
35	Max ask size	=MIN(0,-(C11*(C18+C33)) /C12+(C17+C32))/((C13-C38+C14)*C11/C12+1))	The largest (most negative) ask size for the given price that is allowed
36			
37	Confirmed Order Output		
38	Confirmed price	=MAX(MIN(C3,C13+C12),C 13-C12)	Submitted price after being limited
39	Confirmed size	=MAX(MIN(C4,C28),C35)	Submitted size, after being limited to the max sizes above

	E	F	G	H
2	Existing confirmed orders			
3	Price	Size	Bids only	Ask only
4	10001	-12	=MAX(0,F4)	=MIN(0,F4)
5	10000	10	=MAX(0,F5)	=MIN(0,F5)
6			=MAX(0,F6)	=MIN(0,F6)
7			=MAX(0,F7)	=MIN(0,F7)
8			=MAX(0,F8)	=MIN(0,F8)
9				
10	Trades since Open			
11	Price	Size	P & I	
12	10005	0	=F12*(C13-E12)	
13	10009	0	=F13*(C13-E13)	
14	9999	0	=F14*(C13-E14)	
15	9900	0	=F15*(C13-E15)	
16			=F16*(C13-E16)	

What is claimed is:

1. A method for operating an electronic exchange having a plurality of clients, each client having a margin account and a position on the exchange, the exchange having a predetermined maximum market swing value and an opening market value, comprising the steps of:

(i) receiving an order from a client;

(ii) confirming the order if the margin account is at least equal to a potential position resulting from the order times the maximum market swing value times a threshold value factor, else rejecting the order;

(iii) posting the confirmed order to the electronic exchange;

(iv) adjusting the margin account and setting the client's position to an actual position when a trade of the order occurs;

(v) repeating steps (i) to (iv) for each order during a trading period;

(vi) determining a closing market value for the trading period; and

(vii) adjusting the client's margin account by an amount equal to the difference between a closing market value and the opening market value times the actual position.

2. A method according to claim 1, wherein the threshold value factor is two.

3. A method according to claim 1, wherein a the opening market value is the closing market value of a preceding trading period.

4. A method according to claim 1, wherein the trading period is a business day.

5. A method according to claim 1, wherein the step of confirming includes sending an electronic message to the client.

6. A method according to claims 1 to 5, further including the steps of:

(i) determining that the difference between the closing market value and the opening market value exceeds the maximum market swing value; and

(ii) closing out the client's actual position at a limited closing market value.

7. A method according to claims 1 to 5, further including, at the end of a trading period, the steps of:

(i) determining that a client's adjusted margin account is less than the client's actual position times the maximum market swing value times the threshold value factor; and

(ii) reducing the client's actual position by generating a trade at a trade value;

(iii) further adjusting the client's margin account by an amount equal to the reduction in the client's actual position times the trade value;

(iv) repeating steps (ii) and (iii) until the client's further adjusted margin account is at least

the reduced position times the maximum market swing value times the threshold value factor.

8. A method according to claim 7, wherein the trade value is the maximum market swing value.

9. An electronic exchange system for an exchange having a predetermined maximum market swing value, the exchange system comprising:

a mass storage device for storing and retrieving client information including a client position and a client margin account balance;

a processor unit operatively connected to the mass storage device, the processor unit having means to connect to a network, an exchange engine for receiving and processing orders from a client, an end-of-day engine for marking the margin account to market, and an auto-reduction engine for automatically reducing a client's position if the client's margin account is less than the client's position times the maximum market swing value times a threshold value factor.

10. An electronic exchange system according to claim 9, wherein the processor unit is an internet server.

11. An electronic exchange system according to claims 9 and 10, wherein the network is the internet.

12. An electronic exchange system according to claim 9, wherein the network is a local area network.

13. An electronic exchange system according to claim 9, wherein the network provides secure communications.

14. An electronic exchange system according to claim 13, wherein the secure communications include 128-bit encrypted communications.

15. An electronic exchange for mitigating risk in a market having a periodically fixed value, comprising:

a predetermined maximum market swing value;

a closing market value limited by the maximum market swing value; and

an opening market value determined by the periodically fixed value at an end of a previous trading period.