CLAIMS

1. A method of pricing financial instruments, comprising:

providing at least one computing device comprising one or more processors executing computer-executable instructions stored in memory, said instructions causing the at least one computing device to perform the steps of:

constructing a virtual financial complex network comprising one or more interrelated financial markets;

blending market color data related to at least one of the financial markets with price data to determine blended pricing information;

defining an objective function based on the blended pricing information; and

solving the objective function using an optimization model that determines a minimum market price for each financial instrument across the one or more financial markets.

2. The method of claim 1, wherein the constructing step comprises:

grouping the one or more financial markets according to a market structure or arbitrage conditions; and

linking financial markets within each grouping according to at least one of a package relation amongst financial markets, a spread relation amongst financial markets and arbitrage constraints.

3. The method of claim 2, wherein financial markets comprising futures, forwards, and over-the-counter (OTC) financial instruments are linked within the financial complex network based on package or spread relations, and wherein financial markets comprising options financial

instruments are linked within the financial complex network based on arbitrage constraints.

4. The method of claim 2, further comprising:

linking one or more additional markets to said financial complex network, said additional markets having at least one of inter-market and intra-market connections to the financial markets within the financial complex network.

5. The method of claim 1, wherein the financial complex network comprises linked markets that span two or more calendar years.

6. The method of claim 1, wherein the blending step comprises:

for at least one of the one or more financial markets:

calculating an instantaneous price for each financial instrument in said financial markets;

blending all instantaneous prices, by financial market, with market color data to determine a reference price, a lower bound price and a upper bound price, and

applying predetermined weighting parameters to the blended instantaneous prices to determine a weighting factor for each of the reference price, the lower bound price and the upper bound price.

7. The method of claim 1, wherein the blending step comprises an options market blending step for markets comprising options financial instruments, said options market blending step comprising:

determining whether tenor input includes expiring options, and if so, adjusting said expiring options;

performing a strike space transformation;

calculating an anchor curve representing the value of one or more options across different strikes;

integrating market color data pertaining to options having a same underlying tenor into the anchor curve to generate a reference implied value curve; and

arbitrage-free optimizing the reference implied value curve to generate an arbitrage-free curve.

8. The method of claim 7, further comprising applying a smoothing functional utility (SFU) curve treatment to at least one of the anchor curve, the reference implied value curve and the arbitrage-free curve.

9. The method of claim 7, wherein the anchor curve comprises an implied volatility curve for non-spread options, and wherein the anchor curve comprises an implied correlation curve for spread options.

10. The method of claim 7, wherein calculating the anchor curve comprises:

applying one or more of an at-the-money (ATM) curve blending process, a third-party curve blending process, a reference product curve bending process, and an average price option (APO) curve shifting process to one or more historical settlement curves.

11. The method of claim 7, wherein integrating market color data comprises:

generating an impact curve for each transformed strike point on the anchor curve having market color; and

blending one or more of the impact curves together to generate the reference implied

value curve.

12. The method of claim 1, wherein defining an objective function comprises:

defining a search space based on a solution space and a valid space, said search space defining bounds for feasible solutions to the objective function.

13. The method of claim 12, wherein the solution space comprises a null space or a range of feasible solutions,

wherein the valid space defines a valid range for each of the financial markets, said valid range being defined, in part, by a lower bound vector based on a lower bound price and an upper bound vector based on an upper bound price, and

wherein the intersection of the solution space and the valid space define said search space.

14. The method of claim 1, wherein the optimization model solves the objective function and provides an optimal pricing solution across each of the financial markets within predetermined constraints.

15. The method of claim 1, wherein the at least one computing device comprises one or more of a desktop computer, a laptop computer, a server, a smartphone, a hand-held communication device, a tablet device, a kiosk, and a wired or wireless communications network, and

wherein market color data comprises data relating to at least one of bids, offers, deals, orders, historic settlement prices, current market configurations, active market lists, third-party suggested settlement prices, execution venue deals, depth of market information, external settlement prices, third-party data, historical mutually dependent pricing relationships, and inter

and intra-instrument no-arbitrage constraints.

16. A system for pricing financial instruments, comprising:

at least one computing device comprising one or more processors executing computer-executable instructions stored in memory, said at least one computing device being configured to:

construct a virtual financial complex network comprising one or more interrelated financial markets;

blend market color data related to at least one of the financial markets with price data to determine blended pricing information;

define an objective function based on the blended pricing information; and

solve the objective function using an optimization model that determines a minimum market price for each financial instrument across the one or more financial markets.

17. The system of claim 16, wherein the at least one computing device is further configured to:

group the one or more financial markets according to a market structure or arbitrage conditions; and

link financial markets within each grouping according to at least one of a package relation amongst financial markets, a spread relation amongst financial markets and arbitrage constraints.

18. The system of claim 17, wherein financial markets comprising futures, forwards, and over-the-counter (OTC) financial instruments are linked within the financial complex network based on package or spread relations, and wherein financial markets comprising options financial

instruments are linked within the financial complex network based on arbitrage constraints.

19. The system of claim 17, wherein the at least one computing device is further configured to:

link one or more additional markets to said financial complex network, said additional markets having at least one of inter-market and intra-market connections to the financial markets within the financial complex network.

20. The system of claim 16, wherein the financial complex network comprises linked markets that span two or more calendar years.

21. The system of claim 16, wherein the at least one computing device is further configured to:

for at least one of the one or more financial markets:

calculate an instantaneous price for each financial instrument in said financial markets;

blend all instantaneous prices, by financial market, with market color data to determine a reference price, a lower bound price and a upper bound price, and

apply predetermined weighting parameters to the blended instantaneous prices to determine a weighting factor for each of the reference price, the lower bound price and the upper bound price.

22. The system of claim 16, wherein:

for markets comprising options financial instruments, the at least one computing device is further configured to:

determine whether tenor input includes expiring options, and if so, adjusting said expiring options;

perform a strike space transformation;

calculate an anchor curve representing the value of one or more options across different strikes;

integrate market color data pertaining to options having a same underlying tenor into the anchor curve to generate a reference implied value curve; and

arbitrage-free optimize the reference implied value curve to generate an arbitrage-free curve.

23. The system of claim 22, wherein the at least one computing device is further configured to apply a smoothing functional utility (SFU) curve treatment to at least one of the anchor curve, the reference implied value curve and the arbitrage-free curve.

24. The system of claim 22, wherein the anchor curve comprises an implied volatility curve for non-spread options, and wherein the anchor curve comprises an implied correlation curve for spread options.

25. The system of claim 22, wherein the at least one computing device is further configured to:

applying one or more of an at-the-money (ATM) curve blending process, a third-party curve blending process, a reference product curve bending process, and an average price option (APO) curve shifting process to one or more historical settlement curves.

26. The system of claim 22, wherein the at least one computing device is further configured to:

generate an impact curve for each transformed strike point on the anchor curve having market color; and

blend one or more of the impact curves together to generate the reference implied value

curve.

27. The system of claim 16, wherein the at least one computing device is further configured to:

define a search space based on a solution space and a valid space, said search space defining bounds for feasible solutions to the objective function.

28. The system of claim 27, wherein the solution space comprises a null space or a range of feasible solutions,

wherein the valid space defines a valid range for each of the financial markets, said valid range being defined, in part, by a lower bound vector based on the lower bound price and an upper bound vector based on the upper bound price, and

wherein the intersection of the solution space and the valid space define said search space.

29. The system of claim 16, wherein the optimization model solves the objective function and provides an optimal pricing solution across each of the financial markets within predetermined constraints.

30. The system of claim 16, wherein the at least one computing device comprises one or more of a desktop computer, a laptop computer, a server, a smartphone, a hand-held communication device, a tablet device, a kiosk, and a wired or wireless communications network, and

wherein market color data comprises data relating to at least one of bids, offers, deals, orders, historic settlement prices, current market configurations, active market lists, third-party suggested settlement prices, execution venue deals, depth of market information, external settlement prices, third-party data, historical mutually dependent pricing relationships, and inter

and intra-instrument no-arbitrage constraints.

CLAIMS

1. A method of pricing financial instruments, comprising:

providing at least one computing device comprising one or more processors executing computer-executable instructions stored in memory, said instructions causing the at least one computing device to perform the steps of:

constructing a virtual financial complex network comprising two or more interrelated financial markets;

blending market color data related to at least one of the interrelated financial markets with price data to determine blended pricing information;

defining an objective function based on the blended pricing information; and

solving the objective function using an optimization model that determines a minimum market price for each financial instrument across the two or more interrelated financial markets.

2. The method of claim 1, wherein the constructing step comprises:

grouping the two or more interrelated financial markets according to a market structure or arbitrage conditions; and

linking the interrelated financial markets within each grouping according to at least one of a package relation, a spread relation and arbitrage constraints.

3. The method of claim 2, wherein a first grouping comprises interrelated financial markets comprising futures, forwards, and over-the-counter (OTC) financial instruments that are linked within the financial complex network based on package or spread relations, and wherein a second grouping comprises interrelated financial markets comprising options financial instruments that are linked within the financial complex network based on arbitrage constraints.

4. The method of claim 2, further comprising:

linking one or more additional markets to said virtual financial complex network, said additional markets having at least one of inter-market and intra-market connections to the interrelated financial markets within the virtual financial complex network.

5. The method of claim 1, wherein the virtual financial complex network comprises linked interrelated financial markets that span two or more calendar years.

6. The method of claim 1, wherein the blending step comprises:

for at least one of the two or more interrelated financial markets:

calculating an instantaneous price for each financial instrument in said at least one of the interrelated financial markets;

blending all instantaneous prices, by financial market, with said market color data to determine a reference price, a lower bound price and a upper bound price, and

applying predetermined weighting parameters to the blended instantaneous prices to determine a weighting factor for each of the reference price, the lower bound price and the upper bound price.

7. The method of claim 1, wherein the blending step comprises an options market blending step for the interrelated financial markets comprising options financial instruments, said options market blending step comprising:

determining whether tenor input includes expiring options, and if so, adjusting said expiring options;

performing a strike space transformation;

calculating an anchor curve representing the value of one or more options across different strikes;

integrating market color data pertaining to options having a same underlying tenor into the anchor curve to generate a reference implied value curve; and

arbitrage-free optimizing the reference implied value curve to generate an arbitrage-free curve.

8. The method of claim 7, further comprising applying a smoothing functional utility (SFU) curve treatment to at least one of the anchor curve, the reference implied value curve and the arbitrage-free curve.

9. The method of claim 7, wherein the anchor curve comprises an implied volatility curve for non-spread options, and wherein the anchor curve comprises an implied correlation curve for spread options.

10. The method of claim 7, wherein calculating the anchor curve comprises:

applying one or more of an at-the-money (ATM) curve blending process, a third-party curve blending process, a reference product curve bending process, and an average price option (APO) curve shifting process to one or more historical settlement curves.

11. The method of claim 7, wherein integrating market color data comprises:

generating an impact curve for each transformed strike point on the anchor curve having market color; and

blending one or more of the impact curves together to generate the reference implied value curve.

12. The method of claim 1, wherein defining an objective function comprises:

defining a search space based on a solution space and a valid space, said search space defining bounds for solutions to the objective function.

13. The method of claim 12, wherein the solution space comprises a null space or a range of solutions,

wherein the valid space defines a valid range for each of the two or more interrelated financial markets, said valid range being defined, in part, by a lower bound vector based on a lower bound price and an upper bound vector based on an upper bound price, and

wherein the intersection of the solution space and the valid space define said search space.

14. The method of claim 1, wherein the optimization model solves the objective function and provides an optimal pricing solution across each of the two or more interrelated financial markets within predetermined constraints.

15. The method of claim 1, wherein the at least one computing device comprises one or more of a desktop computer, a laptop computer, a server, a smartphone, a hand-held communication device, a tablet device, a kiosk, and a wired or wireless communications network, and

wherein said market color data comprises data relating to at least one of bids, offers, deals, orders, historic settlement prices, current market configurations, active market lists, third-party suggested settlement prices, execution venue deals, depth of market information, external settlement prices, third-party data, historical mutually dependent pricing relationships, and inter and intra-instrument no-arbitrage constraints.

16. A system for pricing financial instruments, comprising:

at least one computing device comprising one or more processors executing computer-executable instructions stored in memory, said at least one computing device being configured to:

construct a virtual financial complex network comprising two or more interrelated financial markets;

blend market color data related to at least one of the interrelated financial markets with price data to determine blended pricing information;

define an objective function based on the blended pricing information; and

solve the objective function using an optimization model that determines a minimum market price for each financial instrument across the two or more interrelated financial markets.

17. The system of claim 16, wherein the at least one computing device is further configured to:

group the two or more interrelated financial markets according to a market structure or arbitrage conditions; and

link the interrelated financial markets within each grouping according to at least one of a package relation, a spread relation and arbitrage constraints.

18. The system of claim 17, wherein a first grouping comprises interrelated financial markets comprising futures, forwards, and over-the-counter (OTC) financial instruments that are linked within the financial complex network based on package or spread relations, and wherein a second grouping comprises interrelated financial markets comprising options financial instruments that are linked within the financial complex network based on arbitrage constraints.

19. The system of claim 17, wherein the at least one computing device is further configured to:

link one or more additional markets to said virtual financial complex network, said additional markets having at least one of inter-market and intra-market connections to the interrelated financial markets within the virtual financial complex network.

20. The system of claim 16, wherein the virtual financial complex network comprises linked interrelated financial markets that span two or more calendar years.

21. The system of claim 16, wherein the at least one computing device is further configured to:

for at least one of the two or more interrelated financial markets:

calculate an instantaneous price for each financial instrument in said at least one of the interrelated financial markets;

blend all instantaneous prices, by financial market, with said market color data to determine a reference price, a lower bound price and a upper bound price, and apply predetermined weighting parameters to the blended instantaneous prices to determine a weighting factor for each of the reference price, the lower bound price and the upper bound price.

22. The system of claim 16, wherein:

for the interrelated financial markets comprising options financial instruments, the at least one computing device is further configured to:

determine whether tenor input includes expiring options, and if so, adjusting said expiring options;

perform a strike space transformation;

calculate an anchor curve representing the value of one or more options across different strikes;

integrate market color data pertaining to options having a same underlying tenor into the anchor curve to generate a reference implied value curve; and

arbitrage-free optimize the reference implied value curve to generate an arbitrage-free curve.

23. The system at claim 22, wherein the at least one computing device is further configured to apply a smoothing functional utility (SFU) curve treatment to at least one of the anchor curve, the reference implied value curve and the arbitrage-free curve.

24. The system of claim 22, wherein the anchor curve comprises an implied volatility curve for non-spread options, and wherein the anchor curve comprises an implied correlation curve for spread options.

25. The system of claim 22, wherein the at least one computing device is further configured to:

applying one or more of an at-the-money (ATM) curve blending process, a third-party curve blending process, a reference product curve bending process, and an average price option (APO) curve shifting process to one or more historical settlement curves.

26. The system of claim 22, wherein the at least one computing device is further configured to:

generate an impact curve for each transformed strike point on the anchor curve having market color; and

blend one or more of the impact curves together to generate the reference implied value curve.

27. The system of claim 16, wherein the at least one computing device is further configured to:

define a search space based on a solution space and a valid space, said search space defining bounds for solutions to the objective function.

28. The system of claim 27, wherein the solution space comprises a null space or a range of solutions,

wherein the valid space defines a valid range for each of the two or more interrelated financial markets, said valid range being defined, in part, by a lower bound vector based on the lower bound price and an upper bound vector based on the upper bound price, and

wherein the intersection of the solution space and the valid space define said search space.

29. The system of claim 16, wherein the optimization model solves the objective function and provides an optimal pricing solution across each of the two or more interrelated financial markets within predetermined constraints.

30. The system of claim 16, wherein the at least one computing device comprises one or more of a desktop computer, a laptop computer, a server, a smartphone, a hand-held communication device, a tablet device, a kiosk, and a wired or wireless communications network, and

wherein said market color data comprises data relating to at least one of bids, offers, deals, orders, historic settlement prices, current market configurations, active market lists, third-party suggested settlement prices, execution venue deals, depth of market information, external settlement prices, third-party data, historical mutually dependent pricing relationships, and inter and intra-instrument no-arbitrage constraints.