

CLAIMS

1. A system for efficiently modeling datasets, the system comprising:
 - at least one computing device comprising memory and at least one processor, the memory storing a margin model and a liquidity risk charge (LRC) model, the processor executing computer-readable instructions that cause the system to:
 - receive, as input, data defining risk factor data and additional data associated with at least one financial portfolio, the at least one financial portfolio comprising at least one financial product and one or more currencies;
 - execute the margin model, causing the margin model to execute a risk factor simulation process involving the received risk factor data, said risk factor simulation process comprising a filtered historical simulation process configured to apply a scaling factor to historical pricing data for the risk factor data to resemble current market volatility;
 - generate, by the margin model, portfolio profit and loss values for the at least one financial portfolio based on output from the risk factor simulation process;
 - determine an initial margin for the at least one financial portfolio based on the portfolio profit and loss values; and
 - execute the LRC model, causing the LRC model to determine a portfolio level liquidity risk for the at least one financial portfolio, based on the additional data and portfolio profit and loss data from the margin model, the LRC model executing at least one assessment process to account for price movements and at least one assessment process to account for volatility.
2. The system of claim 1, wherein the risk factor simulation process comprises:
 - retrieving the historical pricing data for the risk factor data;
 - determining statistical properties of the historical pricing data; and
 - performing de-volatilization and re-volatilization of the historical pricing data to adjust the historical pricing data for said current market volatility.
3. The system of claim 1, wherein the risk factor simulation process comprises a volatility forecast and the volatility forecast includes a volatility floor, the volatility floor configured to adapt to current market environment conditions.

4. The system of claim 3, wherein the volatility forecast includes a stress volatility component associated with market stress periods.

5. The system of claim 3, wherein the volatility forecast includes an anti-pro-cyclicality component (APC) configured to mitigate pro-cyclicality risk.

6. The system of claim 1, wherein the margin model is configured to generate the portfolio profit and loss values by:

generating one or more risk factor scenarios based on the output of the risk factor simulation process;

generating one or more instrument pricing scenarios based on the one or more risk factor scenarios;

generating one or more profit and loss scenarios at an instrument level, based on the one or more instrument pricing scenarios; and

aggregating the one or more profit and loss scenarios at the instrument level to form one or more profit and loss scenarios at a portfolio level.

7. The system of claim 1, wherein the determination of the initial margin includes applying a correlation stress component to the initial margin associated with a risk of historical correlation destabilization.

8. The system of claim 1, wherein the determination of the initial margin includes applying a portfolio diversification benefit to the initial margin, the portfolio diversification benefit including a predetermined benefit limit.

9. The system of claim 1, wherein the one or more currencies include a plurality of currencies, and the determination of the initial margin includes applying a currency allocation to the initial margin across the plurality of currencies.

10. The system of claim 1, wherein the LRC model is configured to determine a concentration charge and a bid-ask charge based on one or more equivalent portfolio representations of the at least one portfolio, and to determine the portfolio level liquidity risk based on the combination of the concentration charge and the bid-ask charge.

11. The system of claim 10, wherein the one or more equivalent portfolio representations include a first representation based on a delta technique and a second representation based on a value-at-risk (VaR) technique.

12. The system of claim 1, wherein the at least one computing device is configured to generate one or more synthetic datasets, said one or more synthetic datasets configured to model at least one of a benign condition and a regime change condition.

13. The system of claim 1, wherein the computing device is configured to test at least one of the margin model and the LRC model according to one or more testing categories, said one or more testing categories comprising at least one of fundamental characteristics, backtesting, pro-cyclicality, sensitivity, incremental addition of one or more model components, model comparison with historical simulation, and assumption backtesting.

14. The system of claim 1, wherein the at least one financial product comprises at least one of a non-linear financial product and a linear financial product, and the at least one computing device is configured to empirically model each of the non-linear financial product and the linear financial product by a same empirical modeling process.

15. A method for efficiently modeling datasets, the method comprising:
providing at least one computing device comprising memory and at least one processor, the memory storing a margin model and a liquidity risk charge (LRC) model;
receiving, as input, via at least one interface of the at least one computing device, data defining risk factor data and additional data associated with at least one financial portfolio, the at least one financial portfolio comprising at least one financial product and one or more currencies;

executing the margin model, via the at least one processor, causing the margin model to execute a risk factor simulation process involving the received risk factor data, said risk factor simulation process comprising a filtered historical simulation process configured to apply a scaling factor to historical pricing data for the risk factor data to resemble current market volatility;

generating, by the margin model, portfolio profit and loss values for the at least one financial portfolio based on output from the risk factor simulation process;

determining, by the at least one processor, an initial margin for the at least one financial portfolio based on the portfolio profit and loss values; and

executing the LRC model, via the at least one processor, causing the LRC model to determine a portfolio level liquidity risk for the at least one financial portfolio, based on the additional data and portfolio profit and loss data from the margin model, the LRC model executing at least one assessment process to account for price movements and at least one assessment process to account for volatility.

16. The method of claim 15, wherein the risk factor simulation process comprises:
retrieving the historical pricing data for the risk factor data;
determining statistical properties of the historical pricing data; and
performing de-volatilization and re-volatilization of the historical pricing data to adjust the historical pricing data for said current market volatility.

17. The method of claim 15, wherein the risk factor simulation process comprises a volatility forecast and the volatility forecast includes a volatility floor, the volatility floor configured to adapt to current market environment conditions.

18. The method of claim 17, wherein the volatility forecast includes a stress volatility component associated with market stress periods.

19. The method of claim 17, wherein the volatility forecast includes an anti-pro-cyclicality component (APC) configured to mitigate pro-cyclicality risk.

20. The method of claim 15, wherein the generating of the portfolio profit and loss values comprises:

generating one or more risk factor scenarios based on the output of the risk factor simulation process;

generating one or more instrument pricing scenarios based on the one or more risk factor scenarios;

generating one or more profit and loss scenarios at an instrument level, based on the one or more instrument pricing scenarios; and

aggregating the one or more profit and loss scenarios at the instrument level to form one or more profit and loss scenarios at a portfolio level.

21. The method of claim 15, wherein the determining of the initial margin includes applying a correlation stress component to the initial margin associated with a risk of historical correlation destabilization.

22. The method of claim 15, wherein the determination of the initial margin includes applying a portfolio diversification benefit to the initial margin, the portfolio diversification benefit including a predetermined benefit limit.

23. The method of claim 15, wherein the one or more currencies include a plurality of currencies, and the determination of the initial margin includes applying a currency allocation to the initial margin across the plurality of currencies.

24. The method of claim 15, wherein the LRC model is configured to determine a concentration charge and a bid-ask charge based on one or more equivalent portfolio representations of the at least one portfolio, and to determine the portfolio level liquidity risk based on the combination of the concentration charge and the bid-ask charge.

25. The method of claim 24, wherein the one or more equivalent portfolio representations include a first representation based on a delta technique and a second representation based on a value-at-risk (VaR) technique.

26. The method of claim 15, the method further comprising generating one or more synthetic datasets, said one or more synthetic datasets configured to model at least one of a benign condition and a regime change condition.

27. The method of claim 15, the method further comprising testing at least one of the margin model and the LRC model the model system according to one or more testing categories.

28. The method of claim 27, wherein the one or more testing categories comprises at least one of fundamental characteristics, backtesting, pro-cyclicality, sensitivity, incremental addition of one or more model components, model comparison with historical simulation, and assumption backtesting.

29. The method of claim 15, wherein the at least one financial product comprises at least one of a non-linear financial product and a linear financial product, and the margin model is configured to empirically model each of the non-linear financial product and the linear financial product by a same empirical modeling process.

30. A non-transitory computer readable medium storing computer readable instructions that, when executed by one or more processing devices, cause the one or more processing devices to perform the functions comprising:

receiving, as input, data defining risk factor data and additional data associated with at least one financial portfolio, the at least one financial portfolio comprising at least one financial product and one or more currencies;

executing a margin model stored in the non-transitory computer-readable medium, causing the margin model to execute a risk factor simulation process involving the received risk factor data, said risk factor simulation process comprising a filtered historical simulation process configured to apply a scaling factor to historical pricing data for the risk factor data to resemble current market volatility;

generating, by the margin model, portfolio profit and loss values for the at least one financial portfolio based on output from the risk factor simulation process;

determining an initial margin for the at least one financial portfolio based on the portfolio profit and loss values; and

executing an LRC model stored in the non-transitory computer-readable medium, causing the LRC model to determine a portfolio level liquidity risk for the at least one financial portfolio, based on the additional data and portfolio profit and loss data from the margin model, the LRC model executing at least one assessment process to account for price movements and at least one assessment process to account for volatility.