

Financial Innovation & New Structured Products in the Equity World

19 November 2007, London

We will survey the broad range of products now being traded and created in the market for equity investments. These include what are now called vanilla cliquet products and the more recently developed swing and reverse swing cliquet trades. Multiasset structures and dispersion products will also be discussed. A theoretical discussion of the rationale for the creation of these products will be presented. The structure of risk exposures to be managed in the creation of such liabilities will then be enumerated. We shall discuss concepts like the volgamma, the skewgamma and crossgamma effects. This will be followed by a theoretical discussion of the implications of the technology of hedging to acceptability. Concepts of coherent risk measures and coherent utilities are employed to define risk acceptability. We will then survey a collection of models ranging from the traditional jump diffusion, to a number of stochastic volatility models, the local volatility model and a recent extension to local Lévy models, used by industry in the valuation and regular marking to market of these product liabilities. The results of applying a variety of models to the valuation of a variety of products including options on realized variance will conclude the presentation.

Dilip Madan, University of Maryland, Consultant to Morgan Stanley and Visiting Professor, CARISMA

1. Overview of the New Equity Structured Products

⇒ A Survey of the Products

- Common Components for the Products
- Classification of Products
- Trigger Redeemable Notes / Vanilla Arithmetic and Product Cliquets / Swing Cliquets / Napoleonic Features / Incorporating Lock-Ins / Intermediate floors and cap / Melting Baskets / Dispersion Trades / Correlation Trades

⇒ Rationale for the Products

- Rationale for the Products
- The Answer from Utility Theory

⇒ A Unified view of the Products and their Rationale

- Log Gaussian Products
- Consequences of differences in volatilities
- Estimated Products
- Down and In Trigger Redeemable Notes
- Path Dependent Products
- Correlation Trades

2. Risks Involved in Equity Structured Products

⇒ Risk exposure of products

- Describing the Risks
- Enumeration of Risks
- Assessing the Risks
- Surface Exposure of Products
- Remarks on Cliquet Volgamma/ Reverse Cliquet Volgamma/ Swing Cliquet Skewgamma
- Skew gamma in variance swaps
- Importance of Forward Skews
- Cross Gamma Effects
- Cross Gamma in Basket Option Trades
- Structures Exposed to Digital Risk
- Correlation between Equity and Interest Rate Risks

⇒ Supply side of structured products

- Supply Side of Structured Products
- The Relatively Liquid Hedging Assets
- Acceptable Risks

⇒ Modelling the bid and ask prices

- The Ask Price Problem/ The Bid Price Problem
- Implications of the Dual Problems
- Acceptability, Hedging, and Arbitrage
- Introduction to New Law invariant Measures of Acceptability

3. Best Practice Modelling for Pricing and Hedging Equity Structured Products

⇒ Description of models and their properties

- Local Volatility Model
- Local Lévy Models
- Heston Stochastic Volatility
- Merton Jump Diffusion with stochastic volatility
- Stochastic Volatility for Lévy Processes
- Stochastic Jump Arrival Rates

⇒ Results of market calibration

- Results of Calibration on SPX for 20040706
- HSV Calibration / SVJ Calibration / VGSA Calibration
- SVDNE / SVVG / SVCGMY / SVADNE / SVAVG / SVACGMV
- Common Features of Models

⇒ Model prices for equity structured products

- The Products Priced by the Models
- Model Pricing
- Locally Floored Globally Capped Cliquet Model Rankings
- Locally Capped and Globally Floored Cliquet
- Locally Capped and Globally Floored
- Capped Swing Cliquet / Capped Swing Cliquet / Capped Reverse Swing Cliquet
- Reverse Swing Cliquet
- Uncapped Swing Cliquet with Lock In / Swing Cliquet with Lock In
- Trigger Autocancellable Redeemable Note
- Model Rank Correlations
- Volatility Options

⇒ Spot and option risks to be hedged in equity structured products

- Risks in Equity Structured Products
- Forward Spot Slides and Option Trades
- Implicit Hedge Costs
- Conclusion

⇒ Options on Realized Variance

- Independence and diminishing value
- Long Range Dependence
- Sato Processes
- Results on Realized Variance Valuations

The Presenters:

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Professor Madan specializes in Mathematical Finance. He also serves as a consultant to Morgan Stanley, Bloomberg, Caspian Capital LLC, and has consulted with Wachovia Securities and the FDIC. He is a founding member and immediate Past President of the Bachelier Finance Society, recipient of the 2006 von Humboldt award, Managing Editor of Mathematical Finance and the Review of Derivatives Research and Associate Editor for the Journal of Credit Risk, and Quantitative Finance. His work is dedicated to improving the quality of financial valuation models, enhancing the performance of investment strategies, and advancing the understanding and operation of efficient risk allocation in modern economies. Recent contributions have appeared in Mathematical Finance, Finance and Stochastics, Quantitative Finance, and Management Science, among other Journals.

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