Memo

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From: Miltos Drandakis
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cc: Mark Erskine
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Date: 10 September 2013

Subject: **Response to 'The Valuation of Equity Derivatives' Exposure Draft**

Introduction

In relation to IVSC's publication, GPU is responding to the questions raised in the Exposure Draft on equity derivatives valuation circulated in July 2013.

The Global Pricing Unit ("GPU") sits within Markets Business Unit Control (BUC) and is responsible for providing support to Finance globally and across all asset classes. This includes policy and methodology around all forms of independent price testing and reserving while ensuring consistency across products, desks and geographical locations. It is the responsibility of GPU to resolve or escalate any valuation issues that might impact the books and records. The team is headed by Mark Erskine.

Responses

Question 1

There is a plethora of equity derivatives products traded in the financial markets with different characteristics and terminologies. The product list in paragraphs 11-22 includes the majority of equity derivative products.

Cliquet trades are also known as Ratchet trades and GPU believes that the terminology is interchangeably used with the term *Cliquet*. This term is worth adding into the relevant paragraph.

There are four additional types of products worth adding at this stage:

- Variance Swaps
- Dispersion Trades
- Altiplanos
- Rainbow options

Variance Swaps are derivative contracts whose payoff depends on the difference between the variance swap strike and future implied volatility (square root of). At inception, the value of a variance swap is 0. These contracts are written on single stock as well as indices and can been capped and uncapped.

Dispersion Trades are correlation dependent option strategies that involve the simultaneous sale of basket call options and the purchase of underlying vanilla calls. These trades are used to hedge correlation risk generated from other exotic products.

Altiplanos are a type of range accrual options. In this type of product, if none of the underlying assets in the basket outperforms a specific rate, a coupon is paid. If any of the underlyings outperforms the specific rate, then the option converts to a series of vanilla calls on each constituent of the basket.

Rainbow options are a type of basket options. This option type pays off a coupon if all underlyings in the basket move in the intended direction. The underlyings in the basket may have different characteristics such as expiry and strike.

Question 2

The descriptions provided are accurate. More details can be added in a separate (product specific) publication.

Question 3

Complicated derivatives could be covered in a separate product-specific publication. However, in this document a high level reference to correlation specific products (such as correlation swaps, quantos) and fund derivative strategies (such as CPPIs) would be beneficial.

Question 4

The inclusion of formulae provides extra depth to the publication from the technical perspective. As such, formulae would have to provided for whole range of products described (not just a small sample). GPU believes that the publication of a separate, product specific document containing extensive mathematical formulae would be more appropriate.

The formulae presented in the existing document (paragraphs 27-28) are for discrete compounding. Forwards are normally priced using continuous compounding.

For example:

$$F_t = S_t e^{(r-d)^t}$$

Question 5

If the purpose of this TIP is to provide an extensive description of equity derivative products and their pricing, then yes we would prefer to have more mathematical formulae.

However, we believe extensive mathematical formulae would be more appropriate in product specific TIPs (different TIP by level of product path dependency: weak, semi-strong, strong).

Question 6

The information provided on modelling inputs is adequate as this Exposure Draft provides a high level overview. Additional details would be more appropriate in a separate, model specific TIP.

Question 7

It would be very beneficial to map each model to a product type. Most of the valuation issues we come across are generated because of incomplete or simplistic models in exotic structures pricing.

Question 8

Good understanding of valuation issues of derivative products requires awareness of risk sensitivities and their behaviour. It would be beneficial if description of Greeks was accompanied with the respective graphs.

Also, it would be beneficial to the valuation community to supplement the description of each type product type with the respective Greeks and their evolution.

Question 9

This publication would be useful to the following departments:

- BUC (Business Unit Control) Finance
- GPU Finance
- QuaRC (Quantitative Research Centre)
- Market CFO
- Market Risk
- Treasury

Question 10

This TIP provides a high level overview on the valuation of equity derivative products. As far as vanilla products, there is no need to provide extensive detail as there is limited valuation ambiguity.
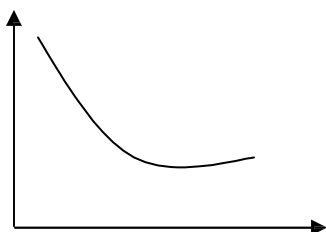
However, the valuation of exotic derivatives is a complicated area that attracts a lot of discussion and research. As such any attempt to reduce diversity of practice will require more extensive analysis and documentation.

Other Points

In paragraph 7, the definition of Path-Dependent could be refined. An alternative definition would be :
"An option whose payoff depends on the path of the underlying price during the contract term".

In paragraph 75, the volatility smile graph is more appropriate to FX underlyings rather than equity underlyings. The upside skew for equity underlyings is not as acute as it is depicted in the existing TIP.

Equity smile looks more like this:

In paragraph 80, it would be helpful if the limitations of LV model were also mentioned: under the specific model the volatility skew reduces (ie becomes flatter) over time. This is an unrealistic assumption.

Finally, a reference to the latest regulatory framework/requirements around valuations would be helpful (for example PRA's Prudential Valuation).