Consolidated Policy on Valuation Adjustments

Global Capital Markets

September 2008

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Version Control

Version	Changed (DD/MM/YY)	Author	Comment
0.1	15/2/07	Group	Initial Version
2.4	13/9/07	EP	Updated commodity section to reflect approval status at end of august (FHJM quanto approved and Compound option approved). Also put in Rob suggestions for other commodity reserves. Updated European rates section with approval status at the end of August (Compass, payoff language) and also change in correlation val adjustment as approved by CDTR.
2.5	17/9/07	EP	Formatted all headers to be coherent
2.6	20/9/07	EP	Updated with some legacy day one P&L reserves for Rates London
2.7	10/10/07	EP	Updated with some legacy day one P&L reserves for Rates London
2.8	11/10/07	EP	Updated with some legacy day one P&L reserves for Rates London
2.9	24/10/07	EP	Updated commodity correlation reserves and rates skew correlation reserves
2.10	29/10/07	EP	Updated FX reserves and rates reserves
2.11	31/10/07	EP	Updated rates reserves (compass)
2.12	26/11/07	EP	Updated rates reserves
2.13	26/11/07	CG	Updated CDO Europe Reserves
2.14	26/11/07	EP	Updated rates reserves and commodity
2.15	6/12/07	EP	Updated rates reserves (Funding and correlation)
2.16	11/12/07	EP	Updated rates reserves Volbonds
2.17	25/02/08	MG	Updated rates reserves Min-Max Volbonds + change in numbering of Global Rates reserves.

2.18	3/03/08	MG	7.10.9 Updated by CAD. 7.10.1 & 7.10.2 methodologies updated by MG. 7.8 CVA LB valuation adjustment released.
2.19	5/03/08	CAD	7.10.9 Updated by CAD and 7.1.8 written by CAD
2.20	23/4/08	EP	7.1.9 adding unapproved transatlantic trades
2.21	23/4/08	Joe Sapia	4.10.4. Corrected to ABX & CDS on CDO table only
2.22	09/6/08	CAD	7.10.10. Updated by CAD and 7.1.7. Updated by CAD
2.23	10/06/08	CG	4.9.2 updated per CDTR of 28-May-08 4.12.4 added per CDTR of 20-Feb-08 4.12.1 deleted and 4.10.8 added per CDTR of 07-Apr-08
2.24	27/06/08	EP	Updated rates
2.25	26/06/08	Joe Sapia	4.10.4 Updated Bid-Offer Delta: ABS Credit Spread Delta
2.26	26/06/08	EP	Commodities for YH. Bid offer delta and vega
2.27	11/06/08	Katie Chan	Updated Muni section
2.28	04/07/08	Fenella Fraser-Ker	Updated Section 13
2.29	04/08/08	EP	Deleted Section 20
2.30	04/09/08	EP	Added EMG Bid offer and updated London rates for all traded migrated out of lens.
2.31	05/09/08	EP	Europe Rates update

2.32	05/09/08	EP	Europe Rates update continue
2.33	09/09/08	EP	Updated 7.9.2
2.34	09/09/08	EP	Release 7.3.1 . Put 7.4.3 for BMA quanto (instead of 7.1.2)
2.35	10/09/08	EP	Proxy Bookings

1. Introduction

1.1. Background

All positions within Capital Markets are required to be accounted for at fair value[1] which is defined as the amount at which the position could be exchanged in a current transaction between willing parties, other than in a forced or liquidation sale.

In order to arrive at fair value, price adjustments are made to reflect both the specific circumstances surrounding a particular position or to reflect the risks and costs not priced into the valuation calculated for that position.

The purpose of this policy is to document the existing policies on valuation adjustments for Capital Markets. These policies may be amended in the future to reflect changes in the business, external regulatory and accounting standards or global policy changes.

1.2. Scope

This policy document applies to valuation adjustments for Capital Markets.

1.3. Valuation Adjustment Categories

Valuation adjustments should fall into one of the categories outlined below.

- Model: adjustments needed due to limitations in a model or its usage.
- Liquidity: adjustments needed due to the uncertainty over the ability to transact at observed market levels.
- Contingent: adjustments required where transactions are dependent on specific non-market based events or where valuation is subject to such events.
- Bid-Offer: adjustments made to bring positions marked at mid-market to their exit value.
- Early Termination: adjustments made to reflect the impact of unwind prior to deal maturity.
- Credit Risk: adjustments required to incorporate the impact of the credit of the counterparty with whom we are transacting.
- Funding Cost: adjustments made where it is appropriate to value the long-term funding implications of a transaction.

1.4. Exemptions

Although the following may currently be classified as valuation adjustments, this policy document does not extend to these items as they are not considered true valuation adjustments.

- Expense Accruals: These are accruals for future expenses such as legal fees and due diligence costs. Expense accruals are considered a timing adjustment rather than a valuation adjustment.

[1] See FAS 157 fair value measurement standard for a complete description

- Un-reviewed Deals: At times, Day 1 P/L is held back for deals that have yet to be reviewed. This Day 1 P/L holdback is considered a timing adjustment rather than a valuation adjustment.
- Re-marking Adjustments: These are adjustments made to the mark-to-market of trades in lieu of actually re-marking the positions (i.e., re-marking the interest rate curve, volatility surface, etc). These adjustments will be released when the positions have been re-marked. Such re-marking adjustments are considered a timing adjustment rather than a valuation adjustment.
- FAS133 DIG B6 Reserves: These relate to the Day 1 P/L holdback of structured notes that have been issued prior to the adoption of FAS155. As such, FAS133 DIG B6 reserves only relate to legacy positions, and thus, it is excluded from this policy document since future trades are not subject to this reserve.
- Centrally Controlled Credit Adjustments: These adjustments for counterparty risk are managed at the corporate level, and thus, are excluded from this policy.

1.5. Validation and Approval

Valuation Adjustment Review Committee (VARC)

Scope: VARC is staffed by global valuation controllers who meet on a monthly basis to ensure compliance of valuation adjustments with the Global Valuation Adjustment policy. Regionally, valuation controllers may choose to form sub-committees with Risk Management and the Business Unit to form solutions but final decision will be made by global finance at VARC. All new, modified and redundant valuation adjustment principles should be approved by VARC. Valuation adjustments with greater than $5m impact to P/L will be escalated to the Complex Derivative Transaction Review Committee.

Exclusion: Changes in the absolute amount of a valuation adjustment that arise as a result of normal changes in trading risk and market parameters do not need to be presented at VARC.

Complex Derivative Transaction Review Committee (CDTRC)

Valuation adjustments with a significant impact to P/L (in excess of $5m) will be presented to the CDTRC at the weekly meeting. CDTRC is staffed by Capital Market Finance, Accounting Policy and Model Validation personnel.

Senior finance management review

Valuation adjustments are formally reviewed by senior finance management on a quarterly basis (Global Head of Equity Product Control, Global Head of Fixed Income Product Control, Global Head of Valuation Control Group and Global Capital Markets Controller). Individual finance managers are required to validate their valuation adjustments on a monthly basis and ensure that the adjustment is re-computed appropriately.

2. GAAP Requirements

Lehman Brothers is required under GAAP to record its assets and liabilities at fair value. The adoption of FAS157 from December 1st 2006 provides guidance on how fair value should be measured. This provides a framework for valuation adjustment policy.

2.1. Fair Value Measurement

FAS157 defines fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date." The basis for a fair value measure is the price at which a company would sell or otherwise dispose of its assets or pay to settle a liability (i.e., an exit price), not the market price that a company acquires its assets or assumes a liability (i.e., not an entry price).

The main principles of FAS157 are:

- a fair value measure should reflect all of the assumptions that market participants would use in pricing the asset or liability including, for example, an adjustment for risk inherent in a particular valuation technique used to measure fair value.
- a fair value measurement assumes that the transaction to sell the asset or transfer the liability occurs in the principal market for the asset or liability or, in the absence of a principal market, the most advantageous market for the asset or liability.
- permit the use of unobservable inputs for situations in which there is little, if any, market activity for the asset or liability being measured. The objective is a market-based measure, rather than an entity-specific measure, regardless of whether there is significant market activity. FAS157 emphasizes that a company should consider the risk inherent in a particular valuation technique (such as an option pricing model) and/or the risk inherent in the inputs to the valuation technique. Accordingly, a valuation technique should include an adjustment for risk if market participants would include such an adjustment in pricing a specific asset or liability.
- when measuring the fair value of a liability, a company should take into account the effect of its own credit standing.
- in an active market, the (price x position) construct would be used irrespective of the normal daily trading volume in the market being able to absorb the size of position held and the impact on prices if an order was placed for the entire position (i.e. no block discounts are permitted for Level 1 securities).

2.2. Observable and Unobservable parameters

Inputs broadly refer to the assumptions that market participants use to make pricing decisions, including assumptions about risk. FAS157 distinguishes between (1) observable inputs, which are based on market data obtained from sources independent of the company, and (2) unobservable inputs, which reflect the company's own assumptions about the assumptions market participants would use.

The use of unobservable inputs is intended for situations in which there is little, if any, market activity for the asset or liability. However, FAS157 emphasizes that a company's valuation technique for measuring fair value should maximize observable inputs and minimize unobservable inputs.

2.3. Technical References

Statement of Financial Accounting Standards No. 157 "Fair Value Measurements"

3. Summary of Valuation Adjustments

3.1. Model Valuation Adjustments

3.1.1. Model: Unapproved model

Description / Rationale: Models may be unapproved, temporarily approved or fully approved. To be fully approved a model must go through the model validation process as set out within the Model Control Committee guidelines. The approval status of a model can be checked within the relevant (FID or Equity) model approval website. A model must be at least temporarily approved before trading. Trades cannot be done on unapproved models. Where a trade is done on a temporarily approved model then the Day 1 P&L arising on the transaction should be reserved until it is fully approved (day 2 P&L should be reported). The Rationale is that the approval process requires consideration of the reserves and in the absence of a methodology the Day 1 P&L is an estimate of the reserve. It is also possible that amendments impacting mark-to-market will arise during this process. In certain circumstances, the initial Day 1 P&L may be recognized e.g. where the Day 1 P&L is significant and the valuation control review shows that there is a minimal requirement for valuation adjustments and where non-recognition may lead to mis-statement of the period's revenue.

Implementation Considerations: Note that model approval will consider the model itself, the type of trade, the calibration methodology and the underlying to which it is being applied.

Example: A hybrid trade incorporating equity underlying into an interest rate model (IR). Although the IR model may be approved, its usage for equities in this context is not. The P&L should be reserved until this instance is approved.

Conditions for release: Full model approval.

3.1.2. Model: Barrier shift

Description / Rationale: In some exotic structures, especially in the case where there are digital payouts, risk management numbers (Greeks) can be distorted when getting close to the strike levels. To prevent this, a "barrier shift" or "call spread" can be embedded in the booking of such a trade to smooth the discontinuity around the strikes.

Implementation Considerations: In some cases, a barrier shift is embedded when the trade is initially booked and stays throughout the life of the trade. In other cases, they are dynamic and can be added or removed based on requirement. The magnitude of the shifts depends on both the maturity and strike level of a trade. Generally speaking, longer maturities and higher strikes warrant bigger shifts.

Example: In the NY Interest Rates world, Callable Range Accruals usually have embedded barrier shifts. When the index reaches the range ceiling, the Gamma number goes to infinity. Therefore, Range Accruals have two levels of barrier shifts added on top of range ceilings: 25bps for trades that are shorter than 12 years; 40bps for trades longer than 12 years.

Conditions for release: Barrier shifts can be removed either when trades mature or when there is a methodology to properly handle risk management numbers for trades with digital payouts.

3.1.3. Model: Fit

Description / Rationale: For complex transactions it may not be possible to conclude that the model used gives a price that is consistent with the price at which we could execute a similar

transaction in the market. Alternatively, the model may give a price that is not consistent with market valuation due to an identified limitation or bias.

Implementation Considerations: Model fit adjustments are taken on a case by case basis as specific deals are put on following review of the models by and discussion with the business unit, Model Validation and Product Control.

Example: Callable swaps are vanilla Bermudan swaption products and a model fit adjustment is required because the callable swap model is not arbitrage-free, particularly for long-dated trades with a short time period to the first call date.

Conditions for release: The model fit adjustments are tracked and are released if and when the business unit, Risk Management and Product Control obtain a satisfactory level of comfort with the modeling issue.

3.1.4. Model: Approximation

Description / Rationale: It may not be possible to capture completely all aspects of a trade within the existing model or system library available. In such cases a standard/trade model type may be used which is an approximation to the actual termsheet.

Implementation Considerations: Adjustments of this nature tend to be bespoke and consideration should be given to quantifying as much as possible the difference between the booked product and the actual trade.

Example: A long callable CDS position has a payout which is time dependent:

Final payoff = (1+4.67%/2)^(2*time)

This is effectively the payout of a standard CDS plus a time dependent accrual amount. As only the standard leg can be booked we need to introduce a valuation adjustment to allow for the additional leg. This can be approximated by considering the default likelihood from the credit spread and calculating the increased payoff across the life of the trade.

Conditions for release: This type of reserve will be valid as long as the booking variation exists.

3.1.5. Model: Numerical Approximation

Description / Rationale: In order to reduce computational time, the model uses a short-cut to approximate valuation; for example, MC simulation is run over a small number of simulations or iterative technique is limited to a maximum number of iterations.

Implementation Considerations: The adjustment and methodology must be approved by Model Validation. There must be a secure method of quantifying the size of the approximation. This model valuation adjustment will be back-tested by Product Control on a quarterly basis.

Example: Gamma approximation to conditional loss distributions in CDO valuation. The approximation may overestimate the tranche survival probability compared with the exact calculation, resulting in underestimation of the value of protection and overestimation of the value of premium leg cash flows.

Conditions for release: At a minimum, the valuation difference resulting from the approximation methodology must be quantified on a quarterly basis. Negative AND positive differences must be taken through current earnings.

3.1.6. Model: Skew

Description / Rationale: Model limitation where the volatility or correlation surface input is not externally calibrated to an observed market surface.

Implementation Considerations: The adjustment and methodology must be approved by Model Validation. There must be a methodology of quantifying the size of the adjustment using production systems.

Example: Interest Rate Volatility Skew reserves for products on the Markov Functional Model. Volatility skew is modeled in the Markov Functional Model through a shift parameter Q that shifts the probability distribution from lognormal (Q=1) and normal (Q=0). The reserving methodology is to identify the probability distribution which would lead to the most conservative pricing for each trade and then reserving the difference in valuation with the actual trade booking.

Conditions for release: The reserve will be required until the model can be calibrated to observable market skew.

3.1.7. Model: Calibration

Description / Rationale: This adjustment intends to capture noise arising from subjectivity in the calibration process.

Implementation Considerations: The adjustment and methodology must be approved by Model Validation. Potential double counting with adjustments related to parameter uncertainties should be carefully avoided. The calibration adjustment may be position or product specific.

Example: The model parameters calibrated for stochastic volatility model to a given volatility surface depend on a choice of weights over the points on the volatility surface. As a result, although the model and volatility inputs are the same, the valuation results can be different by choosing different weights in the calibration process.

Conditions for release: The reserve will be required until such a noise is immaterial.

3.2. Liquidity (Concentration) Valuation Adjustments

Description / Rationale: The size of a position in a particular instrument may be of sufficient volume to significantly impact the market price if we were to trade out of it. In such cases the normal bid-offer spread will not be sufficiently representative of an exit price. It may be appropriate to take a concentration reserve to allow for such an impact.

Implementation Considerations: For items which are classified as Level 1 per FAS157, i.e. that have a directly observable price in an active market then liquidity reserves are specifically not allowed by the standard. This is irrespective of whether we would expect to incur a loss or even if we purchased at a discount for this reason. For Level 2 and Level 3 instruments, concentration reserves are allowed. In setting the reserve, consideration should be given to the likely loss on exit within a relatively short time period (e.g. two weeks). In the absence of a defined policy for liquidity adjustments controllers should attempt to quantify the possible loss with reference to such factors as the traded volume and volatility.

Example: Consider a large block position on an equity stock for which we are restricted in trading. The size of the position against the total market volume is such that exiting this would not be possible at the quoted bid price. The restriction would allow us to classify this position as

Level 2 per FAS157 meaning that it would be possible to take a liquidity reserve. The concentration reserve in this case should be calculated with reference to the Liquidity Adjustment for Equities guidelines.

Considerations for Release: Such liquidity adjustments should be released when the size of the position decreases to a level where such consideration is no longer necessary or it no longer qualifies as a Level 2 or 3 position.

3.3. Contingent Valuation Adjustments

3.3.1. Contingent Deal

Description / Rationale: Where a deal's existence is contingent on an event then the recognition of the P&L from the trade is uncertain until the contingency is removed.

Implementation Considerations: Day 1 P&L to be reserved. Any executed hedges should be included in an analysis of the potential event loss. Potential event loss is to be reviewed daily with Senior Desk and Finance management

Example: FX Forward agreements entered into with parties to a merger and acquisition event are contingent on the acquisition being approved by anti-trust authorities. If the acquisition is not approved, the FX forward contract can be torn-up.

Conditions for release: When the contingent event has passed, the reserve can be released

3.3.2. Contingent Liability

Description / Rationale: The possibility of an obligation to pay certain sums dependent on future events or a defined obligation that must be met.

Implementation Considerations: Quantification of the probability or potential financial impact may require specialist tax and legal advice.

Example: In mortgage transactions, parties to a contract make specific representations and warranties to each other - "reps and warranties". A representation is commonly a declaration of a specific fact that can be verified, e.g., "seller represents that it is a corporation duly organized and validly existing under the laws of the state of Delaware." A warranty may be more of an assurance, e.g. confidentiality agreements. If the representations and warranties are not accurate or are not fulfilled then there are specific penalties.

Conditions for release: When the contingency is either realized as an actual event or does not materialize.

3.4. Bid-offer Valuation Adjustments

Description / Rationale: Bid-offer adjustments are used to account for the potential loss from closing out the risk exposure of a parameter at its exit price in its principal market - long (short) exposure at the bid (offer), respectively. The bid-offer adjustment may apply to all market model parameters and related risk exposures such as underlying prices/rates (Delta), volatilities (Vega), correlations (Correl), dividends (Div-Rho), etc.

Implementation Considerations:

- The adjustment amount depends on whether the positions are marked to bid/mid/offer.
- "Close-out" does not mean the position has to be sold. It allows the use of hedging.

- Netting for the same parameter and underlying may be allowed.

Example: The volatility for a call option is marked at 20%, while the bid-ask levels in a normal market are 18%-21%. If the Vega is $200k, then the potential loss to sell the Vega at 18% volatility is $400k. In this case, the bid-offer adjustment is $400k.

Conditions for release: Both exposures and bid-offer spreads are dynamic over time and the bid-offer adjustment must be re-measured. The impact from re-measurement will be released to P/L.

3.5. Early Termination Valuation Adjustment

3.5.1. Non-contractual Early Termination Valuation Adjustment

Description / Rationale: Non-contractual early termination adjustments are only applicable to transactions where there is a history of early termination with a corresponding loss suffered by Lehman. The adjustment will be commensurate with the expected loss from early termination and in line with the historical experience. The adjustment is amortized using a formula driven methodology. This is performed over a recommended period of not more than 12 months from trade date of the respective transaction.

3.5.2. Contractual Early Termination Valuation Adjustment

Description / Rationale: In the case where Lehman has entered into a contractual obligation that allows the client to terminate early, an amount of initial P&L is reserved to reflect the unearned income on the transaction. The reserve is amortized over the life of the trade, or recalculated on a regular basis depending on the underlying terms.

3.6. Parameter Uncertainty Valuation Adjustment

Description / Rationale: The input parameters to the valuation of a transaction may not be observable in the market. For example, default correlations in first-to-default swaps and long-dated volatilities in equity options are typically not observable. As such, the price verification of these transactions may not be as robust as other transactions.

Implementation Considerations: Parameter Uncertainty adjustments are taken on a case-by-case basis for input parameters that are deemed unobservable. Such adjustments may be based on (1) the P/L impact of a 2 standard deviation movement in the unobservable parameter (following specified guidelines for the range and periodicity of the observation period for the time series), (2) two times the standard bid / offer spread or (3) a percentage shift on the unobservable parameter subject to VARC approval.

Example: The European IRP desk has a $50K PV01 exposure to the 50-year inflation rate bucket. However, the 50-year inflation rate is deemed to be unobservable. If standard bid / offer spreads for inflation swaps is 1 basis point, a $100K adjustment will be taken for this unobservable parameter. This is based on the product of: 1) $50K of PV01 exposure, 2) 1 basis point for standard bid / offer spread and 3) factor of 2.

Considerations for Release: Such adjustments will be released when the unobservable parameter becomes observable.

3.7. Counterparty Credit Risk Valuation Adjustment

Description / Rationale: On a case-by-case basis, where it is assessed that significant credit exposures are held, consideration should be given to holding counterparty credit adjustments

(such credit adjustments will be in addition to the credit adjustments that are calculated and controlled centrally). Credit adjustments represent the potential expected loss arising from counterparty default on obligations to the firm from financial instruments. The valuation adjustment methodology takes into consideration the expected value of counterparty default.

Implementation Considerations: Credit adjustments held at the desk will be incorporated into the firm's total credit adjustments held at the corporate level in conjunction with credit risk management. Credit risk reserves to be considered at CDTR for large trades on a by-exception basis. Final reserve set to be determined in conjunction with Credit Risk Management.

Example: The CDO business has a 5-year un-collateralized receivable exposure of $32m with a hedge fund. At a credit spread of 100bps, the duration of the exposure is 4.5 years implying a PV01 of $14.5k. Therefore the cost of purchasing credit contingent default swap protection is $14.5k * 100bps = $1.45m.

Considerations for Release: The adjustment will be released if collateralization is put into place via a CSA, the deal matures or is terminated early. The adjustment will be dynamic and will be recomputed in line with changes in the market parameters for the underlying exposure, changes in the credit-worthiness of the counterparty and change in the duration of the exposure.

3.8. Funding Cost Valuation Adjustment

Description/Rationale: A valuation adjustment for funding charge is consistent with the requirement of FAS157 to fair value to exit price, as Lehman would incur additional costs if it wishes to lay off the risks of the transaction. Such additional costs are evidenced when firms sell their existing portfolios. A funding charge will be applied for any transaction (or series of transactions) that has initial MTM in excess of $50 million, that requires upfront payments in excess of $25 million and has a tenor of at least 10 years, where the business has not obtained long term funding specifically for the trade[2]. For transactions with shorter maturity and an upfront payment greater than $25mm, but still yielding a funding requirement of $1mm, a funding charge will be applied[3]. The MTM on a trade is calculated by discounting future cash flows using LIBOR flat. Everyday (before any cash flows happen and all other things being equal) the MTM will increase due to time decay, based on LIBOR flat, whereas a funding of LIBOR + 52 bps[4] will be charged in the P/L. Hence, the upfront funding charge will negate the effect of the above asymmetry in the P/L.

Implementation Considerations: The funding charge should be established on day 1 of the transaction, based on Lehman's balance sheet profile at that time. This reserve is to be recalculated dynamically. Any exceptions to the policy have to be approved by the Complex Derivatives Transaction Review committee.

Example: Lehman enters into a 10-year total return swap, paying LIBOR and receiving the returns on a basket of stocks, subject to a minimum of zero. The total return swap has a MTM of $50 million and requires an upfront payment of $25 million. Assuming a straight line decline in the MTM of the swap and a 6% flat discount rate, for simplicity, the following is the calculation of the upfront funding charge (in millions):

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[2] Including collateral that can be re-hypothecated.
[3] E.g. a trade with a $200mm MTM, $26mm upfront payment and a tenor of 5 years will still be subject to a charge.
[4] In the example, the funding charge is assumed to be 52 bps.

Year	MTM	Funding Charge (52 bps)	Discount Factor	Discounted Funding Charge
1	50.000	0.260	0.94340	0.245
2	45.000	0.234	0.89000	0.208
3	40.000	0.208	0.83962	0.175
4	35.000	0.182	0.79209	0.144
5	30.000	0.156	0.74726	0.117
6	25.000	0.130	0.70496	0.092
7	20.000	0.104	0.66506	0.069
8	15.000	0.078	0.62741	0.049
9	10.000	0.052	0.59190	0.031
10	5.000	0.026	0.55839	0.015
				1.144

In the above example, a 10-year swap with an initial MTM of $50 million and an upfront payment of $25 million produces an upfront funding change of approximately $1 million. This deal would have generated $25 million of day 1 P/L, and the thresholds were chosen to capture items yielding a material funding charge, i.e. $1 million given the associated P/L of $25 million.

Considerations for Release: The adjustment will be released against the actual accrual that is charged to P&L on a monthly basis.

Valuation Adjustments by BPM0: Fixed Income (Global)

4. CDO

4.1. Model Unapproved

4.1.1. Model Unapproved: ABS Correlation Portfolio CDO

Model GBU & GERMS models are temporarily approved

Overview of calculation methodology Day1 P&L is reserved until model approval. For those trades where correlation is no longer a significant input (e.g. where the assets are very distressed), we can value the trades on an IO basis, and the difference to system marks is reserved.

Frequency of recalculation Significance of correlation input reviewed Quarterly by Product Control

Product types All products on the GBU or GERMS models

Conditions for release Full model approval

4.2. Model Fit

4.2.1. Model Fit: Low Strike Base Correlation Extrapolation for Bespoke Portfolios

Model Base Correlation Portfolio Model (BCPM) with Indep Spline interpolation

Model Valuation Adjustment Approval Date 11th September 2006

Rationale In the strike dimension we can observe market spreads (and therefore infer correlation) at a number of strike points starting at 3% (for CDX IG and iTraxx Europe) and 10% (for CDX HY). However to price tranches with attachment points below 3%, we need to make an assumption on what correlation to use as the strike tends to zero.

Overview of calculation methodology The production model anchors the base correlation level at 15% for strikes at 0% meaning that the base correlation is a flat 15% for all maturities where the strike is 0%. This assumption is stress-tested by moving the base correlation anchor to a 30% level and re-calibrating the base correlation surface. The adjustment is calculated as the absolute valuation difference between pricing the portfolio using =15% and =30%

Frequency of recalculation Quarterly by Product Control

Product types All products on the Base Correlation Portfolio Model

Conditions for release Observable correlation surface to strike 0%

4.2.2. Model Fit: Low Maturity Base Correlation Extrapolation for Bespoke Portfolios

Model Base Correlation Portfolio Model (BCPM) with Indep Spline interpolation

Model Valuation Adjustment Approval Date 1st May 2007

Rationale In the maturity dimension we can observe market spreads (and therefore infer correlation) at 5Y, 7Y and 10Y maturity. However to price cash flows which are paid before 5Y, we need to impose a base correlation anchor at time zero.

Overview of calculation methodology The production model anchors the base correlation level at 15% for maturities at 0D meaning that the base correlation is a flat 15% for all maturities where the maturity is 0D.This assumption is stress-tested by moving the base correlation anchor to a 30% level and re-calibrating the base correlation surface. The adjustment is calculated as the absolute valuation difference between pricing the portfolio using =15% and =30%

Frequency of recalculation Quarterly by Product Control

Product types All products on the Base Correlation Portfolio Model

Conditions for release Observable correlation surface to at least 3 month maturity

4.2.3. Model Fit: Principal Only CDO Tranche

Model Base Correlation Portfolio Model

Model Valuation Adjustment Approval Date Approval pending – document submitted by QCR

Rationale Principal-only CDO tranches trade in the market at a different price to standard CDO tranches. The BCPM model is fitted to standard tranche/ tranchelet spreads and therefore cannot replicate the observed prices for these products.

Overview of calculation methodology For each position an adjustment is made between the model price and the observed price

Frequency of recalculation Daily

Product types Principal only CDO tranches

Conditions for release Calibration procedure to use Principal Only instruments

4.2.4. Model Fit: Super Senior CDO Tranche

Model Base Correlation Portfolio Model

Model Valuation Adjustment Approval Date Approval pending – document submitted by QCR

Rationale Whilst the BCPM model does not lead to arbitrage in the equity and mezzanine areas of the capital structure it may lead to arbitrage in the higher strike parts of the capital structure (mainly for senior tranches) and the pricing and risk numbers there may be unreliable.

Overview of calculation methodology For each position an adjustment is made between the model price and the observed price

Frequency of recalculation Daily

Product types Super Senior CDO tranches

Conditions for release Calibration procedure to eliminate arbitrage in the capital structure

4.3. Model Approximation

4.3.1. Model Approximation: CDO^2 Proxy Mapping Reserve Methodology

Model Base Correlation Portfolio Model (BCPM) with Indep Spline interpolation

Model Valuation Adjustment Approval Date 29th November 2006

Rationale BCPM handles only vanilla CDO tranche structure. Therefore CDO^2 (that are CDO tranches of a portfolio that itself is comprised of multiple CDO tranches) are mapped to a representative CDO tranche of a super-portfolio consisting of all the credits in the CDO^2 structure (the proxy CDO super-portfolio). This proxy tranche is computed via a Monte Carlo simulation of the structural effects of defaults in the CDO^2 (this methodology was approved under the Base Correlation Model Approval 28th February 2006). The purpose of the proxy mapping adjustment is to assess the quantitative impact of the mismatch between the cash flows to the CDO^2 supertranche and its proxy.

Overview of calculation methodology The pricing of the supertranche and proxy tranche is a function of their cumulative losses. The mismatch between the two losses is in effect a realization of two random variables: the loss to the supertranche and to the proxy tranche. The impact can therefore be assessed from the joint distribution of the two random variables. This joint distribution is generated via a simulation of the default times of the underlying credits in the portfolio and then computing the cumulative losses to both the supertranche and the proxy tranche at different time horizons. The quality of the proxy mapping is determined by how similar these random variables are. [note: the default times are simulated using the Gaussian copula but this is a potential limitation because it is a non-skew consistent methodology for default time generation – hence we compute an adjustment using a relative correction]. The joint distribution can be represented as a histogram of joint probabilities

Raw Histogram Data		Super tranche loss									
		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Proxy tranche loss	10%	83.5%	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
	20%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	30%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	40%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	50%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	60%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	70%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	80%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	90%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	100%	0.1%	0.1%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	13.7%

correlation	97.14%
diagSum	97.28%
biDiagSum	97.71%

proxy tranche		supertranche	
Mean	18.76%	Mean	18.41%
Variance	10.24%	Variance	10.01%
StDev	31.99%	StDev	31.63%
Av. Excess Loss	3.03%		
Excess Loss Ratio	16.16%		

- Mean represents the expected loss =∑ probability*Loss%. For the proxy tranche we sum the probability across the rows and multiply it by the loss% for that row. For the super tranche we sum the probability down the columns and multiply it by the loss% for that column.
- Av. Excess Loss represents the sum of:

1. The area on the grid (ex diagonal) where the proxy tranche loss is greater than the super tranche loss (for long protection). For example, where the proxy tranche loss is 30% and the super tranche loss is 10%, the excess loss is 20%. The probability of this is 0.1% therefore the average excess loss is +0.02% (the proxy tranche is overvalued versus the super tranche). E[Max(Excess Loss Proxy – Excess Loss Super,0)]
2. The excess loss on the diagonal is assumed to be 5% - we assume the joint probability mass is distributed across equivalent losses within the 10% loss buckets but in reality this may not be the case therefore we propose an adjustment that assumes there is an average excess loss of 5% within the 10% buckets along the diagonal. This assumption will be reviewed each month.

- Excess Loss Ratio is the ratio of the average excess loss to the mean loss of the proxy tranche. This represents the Adjustment %.

The quality of fit of the proxy can be quantified using the excess loss ratio where it is the average excess loss in the proxy tranche versus the supertranche expressed as a fraction of the expected value of the proxy tranche. This relative correction is required because we have computed the joint probability distribution using non-skew consistent methodology but need to apply the valuation adjustment to a skew-consistent valuation. The valuation adjustment is then computed as excess loss ratio * Risky component PV. We compute the risky component PV of the CDO^2 by firstly, computing the risk-free component PV of the deal under a risk-free scenario and then subtracting this risk-free PV from the book valuation to leave the residual risky component.

Reference

- CDO^2 Proxy Methodology and Recognition of Day 1 P&L by Jonathan Redfern and Lutz Schloegl October 2006
- A Description of the CDO^2 Proxy Mapping Reserve Methodology for Submission to Model Validation: Extended Version with Appendix by Lutz Schloegl, October 2006

Frequency of recalculation Monthly by product control

Product types All proxy CDO modeling of CDO

Conditions for release BCPM handling of CDO^2

4.3.2. Model Approximation: Approximate Booking

Model Spider

Model Valuation Adjustment Approval Date n/a

Rationale The Spider model is fully approved. However, some functionality is available in the model off-line spreadsheet that is not available in the front-end booking system. Where this is the case, a best-fit entry is made in the booking system and the full booking made in the off-line spreadsheet

Overview of calculation methodology The trade MTM per the off-line spreadsheet is compared to the front-end booking and the absolute difference is held as a reserve. Where this reserve is >$1mm, the trade is to be re-booked.

Frequency of recalculation	Quarterly by product control
Product types	NTD Baskets on Spider
Conditions for release	Implementation of the functionality within B2

4.4. Model Numerical Approximation

4.4.1. Model Numerical Approximation: Gamma Approximation to Conditional Loss Distribution

Model Base Correlation Portfolio Model (BCPM) with Indep Spline interpolation

Model Valuation Adjustment Approval Date 30th October 2006

Rationale A gamma distribution approximation is used to compute trade PV in order to save computation time where the maximum number of loss units exceeds 30,000. However, the approximation may overestimate the tranche survival probability compared with the exact calculation, resulting in underestimation of the value of protection and overestimation of the value of premium leg cash flows. We hold a reserve against this approximation.

Overview of calculation methodology The difference between the PV of a trade using the 2 methods should be reserved. If the PV impact is > US$ 1mm for any individual trade, the approximation may no longer be used for that trade.

Frequency of recalculation	Quarterly by product control
Product types	All products on BCPM
Conditions for release	Release when gamma approximation is no longer used

4.5. Model Skew

4.5.1. Model Skew: Interest Rate Skew in FunOpt4 Gap Option Model

Model FunOpt4

Model Valuation Adjustment Approval Date Unapproved

Rationale There is a lack of correlation between IR level and IR vol in the implemented FDS model. This will only affect trades where the FIC has some fixed component but will not affect the trades where the FIC is floating.

Overview of calculation methodology The skew reserve is calculated by comparing the implemented FunOpt4 model to the more correct MMLib analytics, which are currently only implemented on a spreadsheet. The absolute MTM difference is reserved.

Frequency of recalculation	Quarterly by product control
Product types	All products on FunOpt4
Conditions for release	Implementation of the MMLib analytics.

4.6. Model Calibration

4.6.1. Model Calibration: LCDX Calibration

Model Base Correlation Portfolio Model (BCPM) with Indep Spline interpolation

Model Valuation Adjustment Approval Date Unapproved

Rationale The calibration of LCDX tranches results in pricing away from market observed prices due to the high recovery rates observed in lcds and the embedded optionality in the contract.

Overview of calculation methodology For equity tranches, the reserve is calculated as: % adjustment * outstanding notional. For senior tranches, the reserve is calculated as: bps * duration * outstanding notional

Frequency of recalculation	Daily by product control
Product types	All products priced from the LCDX correlation surface
Conditions for release	Development of the cancellable cds correlation model.

4.7. Liquidity

4.7.1. Liquidity: Document Basis

Rationale Where substitutions are made to the underlying portfolio in old (pre-2003) transactions, the structure remains documented under the ISDA agreements pre-2003. ISDA docs pre-2003 are on a no-restructuring basis. However, any delta hedges can only be executed on current docs, meaning that the desk has an inherent basis in its hedging. We reserve for the additional cost of executing hedges on the pre-2003 documents.

Overview of calculation methodology The PV difference of the hedges between the current restructuring curves and the old no-restructuring curve is reserved on substitution date and amortized over the remaining life of the trade.

Frequency of recalculation	Quarterly by product control
Product types	Pre-2003 correlation trades restructured post-2003
Conditions for release	Maturity or termination of the structured trade.

4.7.2. Liquidity: Loan CDS Bespoke Tranche Liquidity

Rationale Whilst the market for loan cds and LCDX indices and tranches is developing, we have a small number of bespoke tranches referencing LCDS credits. These are valued using the LCDX correlation, but given the market is relatively new there is some liquidity risk surrounding the bespoke products.

Overview of calculation methodology A reserve is taken based on the day1 P&L of the trade.

Frequency of recalculation	Quarterly by product control
Product types	Bespoke CDO tranches referencing LCDS

Conditions for release Developed market in LCDX tranche pricing.

4.8. Contingent Deal

4.8.1. Contingent Deal: P&L Recognition of Principal Protected Notes (PPN)

Rationale The PPN Notes give investors exposure to CDO Funds and can be unwound if the fund performs better than expected. In this case, Lehman would not receive fees for the full legal maturity of the trade.

Overview of calculation methodology At inception, fees are recognized for the first 4 years, or further if the fees are guaranteed. The likelihood of receiving further fee payments is assessed periodically.

Frequency of recalculation Semi-annually by Product Control

Product types Fee based trades where underlyings have a history or likelihood of termination before legal maturity.

Conditions for release Re-assessment of the likelihood of termination of the underlying.

4.9. Contingent Liability

4.9.1. Contingent Liability: Substitution Reserve Account

Rationale At trade inception, a reserve account is created to absorb the costs of future substitutions or changes in the subordination amounts of the trade. If this reserve is not fully used by trade maturity/termination, the balance is returned to the investor.

Overview of calculation methodology Initial documented reserve balance less any costs of substitutions or subordination amount changes.

Frequency of recalculation On the date of trade changes by Product Control

Product types Bespoke CDO tranches

Conditions for release None. At trade termination, the remaining balance is returned to the investor.

4.9.2. Contingent Liability: Collateral Double Default Risk

Rationale There is a risk that the collateral in SPV transactions will not have sufficient value to settle the contingent payment due to Lehman Brothers on default of an issuer in the default swap (an example being Minibond transactions where the FTD note is collateralized by CDOs). Alternatively, Lehman Brothers may have to bear the cost of replacing collateral which has fallen below a given criteria (e.g. below AA-rated).

Overview of calculation methodology

Reserve = (1- Equivalent Notional) * Protection PV(%) * Basket notional

where

Equivalent Notional = Min (1-Basket recovery, CDO note value(%)*80%) / (1-Basket Recovery) and the 80% factor is reviewed on a quarterly basis.

Frequency of recalculation Monthly by Product Control

Product types Minibond transactions

Conditions for release Higher value of the CDO collateral relative to the default payments due on the NTD basket

4.9.3. Contingent Liability: Quanto Reserve

Rationale Structured credit issuance may be in CCYs other than USD and EUR, whilst any delta hedges will be in these 2 main currencies. There is therefore a quanto effect in the delta hedging process which will lead to further hedging costs.

Overview of calculation methodology Reserve = Adj% * Non-USD/EUR pv, where Adj% varies according to the trade ccy.

Frequency of recalculation Trade date by Product Control

Product types New deals in non-USD/EUR

Conditions for release Close-out of risk exposure

4.9.4. Contingent Liability: Various

Rationale Individual trades may, by the nature of structured products, require additional reserves.

Overview of calculation methodology Per trade

Frequency of recalculation Per trade

Product types Per trade

Conditions for release Close-out of risk exposure

4.9.5. Contingent Liability: Index Swap Adjustment

Rationale Some bespoke transactions are identical to a liquid index except for a few names. These trades should have MTM values that are very close to the relevant liquid index. To eliminate this intrinsic basis for P&L and risk management, the credit spreads of the underlyings are "swap adjusted" to the level of the appropriate index.

Overview of calculation methodology The credit spreads of the underlying reference entities are adjusted to eliminate the intrinsic basis in the index, and the trade revalued. The MTM impact is adjusted for.

Frequency of recalculation Daily

Product types Bespoke CDO tranches with small differences to a liquid index tranche.

Conditions for release Automation of the swap adjustment process for the relevant products

4.9.6. Contingent Liability: Deal Specific Adjustments

Rationale Individual trades may, by the nature of structured products, require additional reserves.

Overview of calculation methodology Deal Specific reserves are taken on a case-by-case basis. Some review of the existing reserves is still required.

Frequency of recalculation Monthly following review

Product types All

Conditions for release Close-out of risk exposure

4.10. Bid-Offer

4.10.1. Bid-Offer Delta: Single Name Credit Spread Delta

Rationale Single name credit curves are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology Credit spread Pv01 risk is netted across all bespoke and single name default swap credit derivative products, and summed across maturity bucket for each Issuer. The reserve is calculated as:

Credit Spread Reserve = $\sum$ abs (net Credit Pv01) * 5Y Credit Spread * Bid-Offer %

where Bid-Offer % is defined as:

Category	Definition	Bid-Offer as % of Mid
IG	issuer 5Y spread < 5Y iTraxx Xover spread	10%
HY	issuer 5Y spread > 5Y iTraxx Xover spread	5%

and 5Y Credit Spread is capped at 1000bps.

Frequency of recalculation Bi-Weekly by Product Control

Product types All bespoke and single name default swap credit derivative products.

Conditions for release Close-out of risk exposure

4.10.2. Bid-Offer Delta: Index Credit Spread Delta

Rationale Credit Index curves are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology Index01 risk is taken by series and maturity. Netting adjustments are made to take into account curve positions which can be closed out at a lower cost relative to out-right positions. The curve trades are netted in the order of:

Order	Curve Trade	Mid-Spread Used
1	5s 10s	5Y
2	5s 7s	5Y
3	7s 10s	7Y

The bid –mid or mid-offer spread is assumed to be 1 % and the calculation is therefore:

Index Spread Reserve = ∑abs (net Index Pv01 by index/curve positions) * Credit spread * 1%

+ ∑abs (net Index Pv01 by index/outright maturity) * Credit spread * 1%

Frequency of recalculation Bi-Weekly by product control

Product types Credit spread Pv01 risk is netted across all bespoke and single name default swap credit derivative products.

Conditions for release Close-out of risk exposure

4.10.3. Bid-Offer Delta: Tranche Credit Spread Delta

Rationale Index tranche spreads are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology Correlation risk is expressed as a 1bp sensitivity to the tranches of the calibration instrument used in the Base Correlation model (CDX and iTraxx tranches) - the Tranche Spread Pv01 sensitivity. This sensitivity can be expressed in terms of liquid tranches or liquid tranchelets. This sensitivity is netted across bespoke CDO and index tranche default swaps. The bid offer for liquid tranches is the actual bid-offer observed from the market levels for these tranches. For tranchelets, the bid-offer is assumed to be 1.5% on notional for equity tranchelets and 5% * mid-mark for all others. Each desk is reserved according to the risk management they use. Therefore the Bespoke Correlation book is reserved on the basis of tranchelets, whilst all other desks are reserved on the basis of liquid tranches.

Calculation is therefore:

Tranche01 Bid-Offer Reserve = ∑ abs (Tr01 by series by tranche) * ½ bid-offer spread

OR

For mezzanine tranchelets: Tranchelet01 Bid-Offer Reserve = ∑ abs (Trlet01 by series by tranchelet) * 5% * ½

+ For equity tranchelets: Tranchelet01 Bid-Offer Reserve = notional equity equivalent * 1.5% * ½

Frequency of recalculation Bi-Weekly by product control

Product types Bespoke CDOs, index default swaps and index tranche default swaps are netted

Conditions for release Close-out of risk exposure

4.10.4. Bid-Offer Delta: ABS Credit Spread Delta

Rationale Derivatives on ABS are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology Notionals can be net down by product type, by credit rating. For each open risk position the reserve is calculated as follows:

ABS CS01 Reserve = Notional * ½ bid-offer spread

where bid-offer spreads are observed to be:

Rating	CDS on CDO	ABX	Single Name CDS
A and above	1 point	½ point	1 point
BBB and below	1point	1 point	1 point

Frequency of recalculation Monthly by product control

Product types Credit Derivatives on ABS

Conditions for release Close-out of risk exposure

4.10.5. Bid-Offer Vega: Credit Vega

Rationale Credit volatilities are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology The credit vega risk is expressed in terms of pv impact per % vol. The sensitivity is netted by underlying credit risk and by option maturity. The bid-offer spread is taken from quoted market levels, and the reserve is calculated as:

Vega Bid-Offer Reserve = ∑ abs (Vega by option maturity) * Vol Mark * 100 * Bid-Offer Spread * ½

Frequency of recalculation Bi-Weekly by product control

Product types Credit Default Swaptions

Conditions for release Close-out of risk exposure

4.10.6. Bid-Offer Delta: Interest Rate

Rationale Interest-rate curves are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology The net interest rate risk from all products across the portfolio is by tenor across each ccy yield curve into 6 buckets: 0-3yrs, 3-5yrs, 5-10yrs, 10-20yrs, 20-30yrs, 30yrs+. Bid-Offer spreads are taken from market quotes provided by IRP Product Control, and the reserve calculated as:

IR Bid-Offer Reserve = ∑ abs (net IR01 by tenor) * Bid-Offer Spread * ½

Frequency of recalculation Monthly by product control

Product types All

Conditions for release Close-out of risk exposure

4.10.7. Bid-Offer Vega: Interest Rate Vega

Rationale Interest-rate volatilities are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology No IR Vega reserve is currently held in CDO Europe.

Frequency of recalculation Monthly by product control

Product types All

Conditions for release Close-out of risk exposure

4.10.8. Bid-Offer Vega: NTD Correlation

Rationale NTD Baskets trade on a %SoS basis, and a re marked at mid. Under FAS157, we must hold trading assets at an exit price, or marked to worst. where bid-offers are observed as 10% SoS

Overview of calculation methodology

Corr01 risk in the NTD Baskets is netted across benchmark baskets according to a scorecard against the Totem portfolios. Bid-Offer spreads are taken as 10% for trades which pass and 20% for baskets which fail the scorecarding tests.

NTD Correlation Bid-Offer Reserve = ∑ abs (net Corr01 by benchmark) * Bid-Offer Spread * ½

Frequency of recalculation Monthly by product control

Product types NTD Baskets

Conditions for release Close-out of risk exposure

4.11. Early Termination Valuation Adjustment

4.11.1. Early Termination: Non-Contractual

Overview of calculation methodology No non-contractual ETRs are held in CDO Europe.

Frequency of recalculation Monthly by product control

4.11.2. Early Termination: Contractual Early Termination Provisions

Rationale Where trades have terms relating to fees due if early termination occurs, these provisions must be recognized in the P&L.

Overview of calculation methodology Fees recognized are capped at the early terminations levels until such time as the early termination period expires.

Frequency of recalculation Quarterly by product control

Product types Any product with documented early termination clauses

Conditions for release Expiry of the appropriate period

4.12. Parameter Uncertainty

4.12.1. Parameter Uncertainty: Recovery Rate Uncertainty

Rationale For single-name cds, the recovery rate is an agreed parameter whilst trading and is therefore implicitly observed in the market. We therefore do not require a reserve for single-name cds or index trades.

For synthetic CDO tranches, the aggregation of individual default probabilities within tranches causes recovery risk to behave in a significantly non-linear fashion and therefore there is some uncertainty about the impact of the recovery rate assumptions on the tranche MTM. We therefore apply a reserve due to uncertainty around recovery rates for all bespoke correlation trades.

Overview of calculation methodology From the levels of executed fixed-recovery bespoke CDOs we can bound a cost of portfolio recovery risk. For risk exposures significantly larger than the rest of the portfolio, there is doubt about the reliability and ability to trade at the observed levels and hence we apply an extra charge to capture this uncertainty.

The reserve is calculated as:

$$\text{Reserve} = \text{abs}(\text{Rec05 by issuer}) + \sqrt{\text{sum of squares (Rec10 by issuer)}}$$

Where Rec05 is the sensitivity to a 5% shift in the recovery rate.

Frequency of recalculation Bi-Weekly by product control

Product types All bespoke portfolio credit derivative products

Conditions for release Market trading and observability of recovery rates

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4.12.2. Parameter Uncertainty: Credit CPPI Gap Option Uncertainty

Rationale For credit CPPI trades, there is uncertainty around the credit volatility and vol of vol used since this is unobservable in the market.

Overview of calculation methodology The reserve is calculated by individually shifting the following parameters by 2 standard deviations and taking the sum of the valuation impact as a reserve:

1. Credit Volatility

2. Credit Vol of Vol
3. IR-Credit Correlation
4. Jump Rate
5. Jump Mean
6. Jump Standard Deviation

Frequency of recalculation Quarterly by product control

Product types All credit CPPI or CPDO.

Conditions for release Market trading and observability of credit volatility, vol of vol and credit-IR correlation up to the tenor of the trade.

4.12.3. Parameter Uncertainty: Leveraged Super Senior Gap Risk

Rationale Lehman bears some risk that leveraged super senior tranches may fall in value before they can be de-levered.

Overview of calculation methodology

Frequency of recalculation Quarterly by product control

Product types Leveraged Super Senior bespoke tranches.

Conditions for release Observability of leveraged gap risk.

4.12.4. Parameter Uncertainty: ABX Correlation

Rationale Following the reduction in trading volumes in TABX, correlation between RMBS assets is difficult to observe

Overview of calculation methodology

A conservative view of RMBS correlation is of high correlations, both given the macro environment and the most recent observed levels from the TABX market.

Reserve = MTM impact of repricing each trade to 90% correlation.

Frequency of recalculation Monthly by product control

Product types Tranches on AAA & AA ABX

Conditions for release Observability of TABX markets

4.13. Counterparty Credit Risk

4.13.1. Counterparty Credit Risk: Uncollateralized Receivable Exposure

Rationale Counterparty credit reserves are taken at the firm level but it is possible that on default of a counterparty, the CDO desk will suffer an asymmetric loss or gain as a result of the netting of counterparty exposures at the firm level. A valuation adjustment is therefore held against the possibility of a loss affecting the CDO desk. This desk-level

counterparty reserve is netted against the firm's counterparty reserve requirement at each month-end to preserve the firm's overall reserve requirement and is therefore consistent with FAS157.

Overview of calculation methodology The reserve is calculated separately for each receivable exposure where there is no CSA in place. It is the estimated cost of buying protection against the potential loss, taking account of estimated recovery values or recoverable collateral values.

Frequency of recalculation	Quarterly
Product types	All OTC derivatives without CSA
Conditions for release	Close-out of all trades with non-CSA counterparties with positive MTM

5. Commodities Trading

5.1. Unapproved Models:

5.1.1. Model Unapproved: QED (baskets with barriers) / Galaxy

5.1.2. Model Unapproved: Basket of indices modeled as one index (trade id: 697230, 697231, 712098CS).

5.1.3. Model Unapproved: Hydro model

5.1.4. Model Unapproved: PPVM

5.1.5. Model Unapproved: Bio Diesel

5.1.6. Model Unapproved: Forward Start options

5.1.7. Model Unapproved: Spread Options (heat rate and inter-connectors)

Model Name Inter-connector option

Model Status Temporary approval

Description of trade type: The inter-connectors are a means of transferring electricity across borders. It is possible to buy capacity on these at auctions and this entitles the purchaser the right but not the obligation to move electricity in a specified direction across the inter-connector. Auction dates, rules and exercise of this optionality is different for different grids but typically payment is monthly in advance and exercise involves nomination of intentions to the relevant grid. Economically inter-connector capacity is the same as a strip of spread options. From an accounting perspective there is discussion as to whether these trades meet FAS 133 readily convertible to cash rules as for some grids there is not an active market to sell these products on.

Model Name Heat-rate option

Model Status Temporary approval

Description of trade type: A trade similar to a virtual power plant / refinery / other asset. It is usually used to hedge a utility / refinery. In the case of a refinery, a typical trade would be to supply the inputs (eg oil) and take the outputs (eg refined products) from either a specific asset/assets or based on a fixed conversion formula. Where conversions are fixed such transactions typically meet derivative rules under FAS 133 since the notional inputs & outputs are clearly defined, provided that the contractual default terms specify net settlement. If the conversion formula is not fixed then the FAS 133 position is more complex and the position regarding the maximum / minimum notional needs to be understood.

5.1.8. Model Unapproved: Storage

Model Name Storage

Model Status Temporary Approval

Description of trade type: A contract to use a storage facility such as a tank at a port or underground gas storage. Currently this fails FAS 133 derivative rules. There is discussion across the industry regarding whether storage should actually be marked to market (the economic value of storage is dependent on the size of the storage facility and the shape of the forward curve. In highly volatile and seasonal markets storage is particularly valuable because when

prices are low (e.g. summer) the commodity can be stored and then subsequently released during shortages or periods of high demand (e.g. winter).

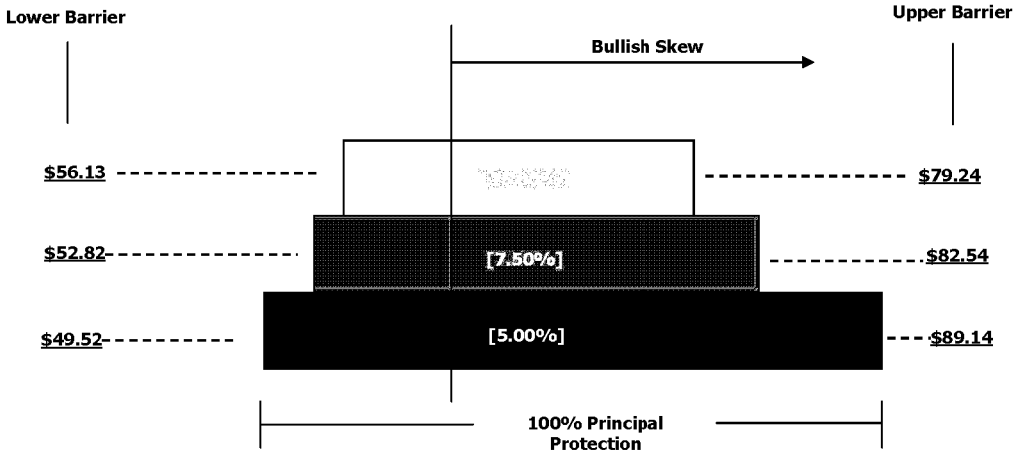
5.2. Model Skew: FHJM Wedding Cakes

Model Name FHJM for Wedding Cakes

Rationale (…)

Description of trade type: An exotic hybrid product where the payout is dependent upon how an underlier (in this case a commodities underlier or underliers) behaves in relation to a defined set of barriers. The payoff often looks like a wedding cake, hence the name. Principal may be protected or unprotected. The barrier could be distributed in any way around the current spot price.

For example – bullish crude oil wedding cake (principal protected):



Overview of calculation methodology

Frequency of recalculation Monthly

Product types

Conditions for release

5.3. Model Barrier Shifts: Barrier Shift

Rationale Barrier shifts are added to barrier options in order to (1) facilitate better risk-management of digital risk which would otherwise be distorted at or near the strike and (2) to reflect the exit price of these types of products. There are two considerations:

- The daily fixing risk, i.e. how much of a daily move is accommodated in order to capture the fixing without incurring "fixing costs" (getting out of the delta). An adjustment corresponding to daily implied move suffices to insure against negative fixing effects. For example, within oil, a volatility of 25% corresponds to a daily standard deviation of 1.57%.

- The binary risk, i.e. how much of a call spread is used to hedge the binary at maturity, if the barrier has not been breached during the life of the trade. A 3% call spread is sufficient for small enough notionals, which is equivalent to a 1.5% shift of the binary strike.

Since the two events described above are exclusive, a 1.5% reserve shift in the barrier is sufficient to guarantee that either risk is covered.

Overview of Calculation Methodology The calculation is performed within the modeling itself. Therefore this reserve is dynamic and within the mark to market valuation of the product.

Frequency of recalculation Dynamic, within the modeling. Evaluation should be realized on a quarterly basis by Product controllers

Product types All trade types with barrier risk

Conditions for release Barrier shift levels will be compared to market levels for appropriateness and only when approved by model validation and product control will they be changed. Barrier shifts will dynamically be removed (or added) as risk positions change and trades approach maturity.

5.4. Model Fit: FHJM Reverse Convertibles

Model Name FHJM for Reverse Convertibles

Rationale (…)

Overview of Calculation Methodology

Frequency of recalculation

Product types An exotic hybrid product where the payout is X% if the product does not pass the barrier and Y% if the product passes the barrier. Y will be defined in the terms of the deal but will typically involve a reduction in the payout and sometimes also the principal.

Conditions for release

5.5. Model Fit: Binaries

Rationale A reserve equal to the approximate cost of trading out of such a structure in the market is held. This reserve covers:

- The binary risk, i.e. how much of a call spread is used to hedge the binary at maturity.
- The portfolio effect of having a number of binaries at different strikes (i.e not all strike prices can be a problem on maturity for each maturity date).

Frequency of recalculation Monthly by product control

Product types For all significant binary risk.

Conditions for release Close-out of risk exposure

5.6. Bid- offer: Delta:

Rationale: Net delta risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price. A reserve is therefore calculated based on the perceived cost of

unwinding in the market and positions bucketed into time, and where appropriate, product buckets.

Overview of calculation methodology

Reserve = sum (absolute bucketed risk positions * bid-offer charge).

Positions are broken down into time and product /location buckets as is most appropriate for the particular business and market. Key concepts are:

1. Time buckets are broken into short, medium, long and (if applicable) very long term maturities. These time buckets will naturally vary slightly for different product groups depending on how those products trade (e.g. gas tends to trade in seasons, oil trades more by calendar), and their respective liquidity.
2. Some product groups will be netted together, others will not. For example, it makes sense to apply netting of electricity positions across location where there is regular and consistently available transmission flow from one grid to another. It would also make sense to net similar grades of oil distillate on the grounds that they are almost perfectly correlated. It would not, however make sense to net, for example, Brent crude with aluminium as the two products do not regularly trade as a spread to each other and exiting such a position would effectively require performance of two trades. You would also not apply any netting between US Power and UK Power since, while the two will clearly be correlated (high fuel prices would affect both), there is currently no means of transporting electricity across the Atlantic. The netting methodology will be determined based on the main open exposures and the manner in which those would be most likely closed out / traded in the market and as markets evolve, the methodology might change.
3. Sometimes market data for the bid-offer spread is not readily available and therefore needs to be estimated using the data which is available. Where this is performed it will be done so using reasonable assumptions.

Frequency of recalculation	Monthly by product control
Product types	All commodity deals
Conditions for release	Close out of risk position

5.7. Bid- offer: Vega:

Rationale Net Vega risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price. A reserve is therefore calculated based on the perceived cost of unwinding in the market and positions bucketed into time, and where appropriate, product buckets.

Overview of calculation methodology

Reserve = sum (absolute bucketed risk positions * bid-offer charge).

Positions are broken down into time and product / location buckets as is most appropriate for the particular business and market. Key concepts are:

(1) Time buckets are broken into short, medium, long and (if applicable) very long term maturities. These time buckets will naturally vary slightly for different product groups depending on how the products trade (e.g. gas tends to trade in seasons, oil trades more by calendar), and their respective liquidity.

(2) Some product groups will be netted together, others will not. The netting methodology will be determined based on the main open exposures and the manner in which those would be most likely closed out / traded in the market.

(3) Cost of trading out of significant skew-smile exposures will be considered. In the event that significant skew-smile exposures exist and the volatility surface is flat then a model reserve (rather than bid-offer reserve) would be held against that.

(4) Sometimes market data for the bid-offer spread is not readily available and therefore needs to be estimated using the data which is available. Where this is performed it will be done so using reasonable assumptions.

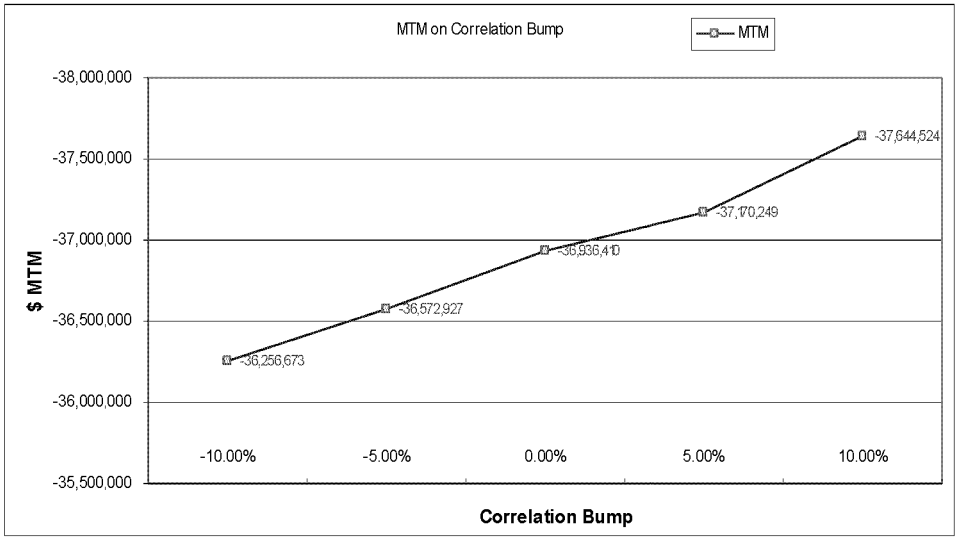
Frequency of recalculation	Monthly by product control
Product types	All commodity deals
Conditions for release	Close out of risk position.

5.8. Parameter Uncertainty: Historical Correlation

Rationale In order to recognize uncertainty in marking correlation between commodity products.

Overview of calculation methodology **10% shift**. The basket pricer is using a correlation matrix to derive the MTM of the portfolio. In order to derive a correlation reserve for the basket trades in the commodities portfolio we bump up the correlation matrix by (-10%,-5%, 5%, 10%) to calculate its effect on the MTM of the portfolio.

The calculation only uses the +10% bump. The graph below shows the results for September month end as an example.



Frequency of recalculation Monthly by product control

Product types All Commodity baskets using the "Basket model without term structure"

Conditions for release Market trading and observability of implied correlation for small portfolios.

5.9. Parameter Uncertainty: Deal specific.

Overview of calculation methodology Conservative assessment of expected loss

Frequency of recalculation At least quarterly by product control

Product types Assessed on a trade by trade basis as necessary.

Conditions for release Unwind of risk or the parameter becoming observable in the market and appropriately reserved against under another category.

5.9.1. Parameter Uncertainty: Deal Specific: Exxon

Rationale Probability of losses from Exxon calling force majeure on a bespoke physical gas trade.

CDTR Approval Date 06/09/07

Overview of calculation methodology Based on a historical simulation of what our worst-case losses could be from Exxon calling FM, probability weighted for a conservative assessment of Exxon calling FM. This reserve amounts to 0.12p/therm which amounts to approximately $1.8mm on day-1.

5.9.2. Parameter Uncertainty: Deal Specific: LBPBN Index

Rationale	Uncertainty in LBPBN volatility.
CDTR Approval Date	28/11/07

Overview of calculation methodology The LBPBN index is very similar to the Dow Jones AIG Commodities index. Implied volatilities for the LBPBN index are not observable; however, implied volatilities for the Dow Jones – AIG Commodities index are observable. Furthermore, implied volatilities for the LBPBN index should be lower than the implied volatilities for the Dow Jones – AIG Commodities index since the Pure Beta indices use a reallocation methodology that is different from the one used by standard commodities indices. Specifically, the Pure Beta indices try to reduce the distortion in the market around supply and investment flows by optimizing the term of the reallocation up to 12 months out on the curve. On the other hand, standard indices use more short dated contracts. Due to the unobservability of implied volatilities for the LBPBN index, a parameter uncertainty adjustment will be taken for the difference between where the desk is marking implied volatilities for the LBPBN index and the implied volatilities for the Dow Jones – AIG Commodities index. In effect, the desk will be marking implied volatilities to the Dow Jones – AIG Commodities index. This parameter uncertainty adjustment is approximately $2.4 million or 2 volatility points.

Frequency of recalculation	Monthly by product control
Product types	All trades based on this index
Conditions for release	Unwind of risk or the parameter becoming observable

5.10. Credit: Deal specific.

Overview of calculation methodology Where credit exposure on a given transaction is significant it may be most appropriate to hold the credit reserve against that individual trade rather than as part of the centrally calculated credit reserve. A journal would take place between the commodities area and the central credit calculation to avoid double counting.

Frequency of recalculation	At least quarterly by product control
Product types	Only on individual deals where the credit exposure is significant
Conditions for release	Close out of credit risk

Valuation Adjustments by BPM0: Fixed Income (EUROPE)

6. Foreign Exchange

6.1. Model: Barrier shift

Model One Plus

Valuation Adjustment Approval Date Not approved

Rationale Digital risk trades suffer from distorted delta and gamma risk at or near the strike. In order to risk manage this impact a barrier shift is applied to smooth the discontinuity. This is standard practice in the market and the fair value of digital type trades will include an adjustment for barrier shift (alternatively known as call spread).

Overview of calculation methodology The barrier is bent by 50pips to take a dynamic reserve that will be automatically released if the barrier is hit.

Frequency of recalculation Daily

Product types All trade types with digital risk

Conditions for release Barrier shifts will be compared to market levels to determine appropriateness and only when approved by model validation and product control will they be changed. Barrier shifts can be removed either when trades mature or when there is a methodology to properly handle risk management numbers for trades with digital payouts.

6.2. Model Skew FX volatility skew adjustment from TV/TS Model to One Plus Model

Model One Plus Model

Valuation Adjustment Approval Date Not Approved

Rationale The TV and TS models are not volatility skew-consistent models, therefore trades are replicated in a skew-consistent model offline (One Plus) in order to achieve the correct fair value.

Overview of calculation methodology MUREX spots, ATM vols and exotic trade population are exported to SPIRIT which uses the One Plus model. The difference between the non-dynamic (TSLD) volatility model and the One Plus Model is taken as a valuation adjustment.

Frequency of recalculation Weekly

Product types Exotic FX Options

Conditions for release Exotic skew model integrated into Murex or when P&L is sourced directly from SPIRIT

6.3. Contingent Deal

Rationale The deal knock-out / knock-in is based on a non-market parameter driven event and therefore cannot be accounted for by the model.

Overview of calculation methodology 100% of the deal P&L is withheld throughout the life of the deal or until the non-market parameter event has expired.

Frequency of recalculation Daily

Product types	Contingent forwards and options
Business BPM2 / Book	FX Global Deal Contingent BLO
Conditions for release	Expiry of deal or expiry of non-market parameter event

6.4. Bid-Offer Delta: Bid-Offer FX

Rationale Net FX IR risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology We take the consolidated net risk (total IR risk and bond risk combined) for the desk against each IR curve, bucketed into 3 tenors: <1yr, 1-5yr, and >5yr , and multiply this risk by half the bid-offer spreads we see in external quotes. For external quotes we use Swap rates for >1yr and FRAs and Futures quotes for <1yr. We allocate the desk level reserve to individual traders by re-performing the calc at a trader level to get appropriate allocation weightings

Frequency of recalculation	Monthly by product control
Product types	All products with FX IR risk
Conditions for release	Elimination of FX IR risk

6.5. Bid-Offer Vega: Bid-Offer FX ATM Volatility

Rationale Net FX Vega risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology Vega by currency pair is bucketed into <5year and >5year buckets. Spreads are applied based on the liquidity and time zone of each currency pair. The bid-offer adjustment is calculated as ½*bid-offer spread*Vega.

Frequency of recalculation	Monthly by product control
Product types	All products with FX volatility risk
Conditions for release	Elimination of FX volatility risk

6.6. Non-contractual Early Termination Valuation Adjustment

Rationale If the counterparty early terminates a deal soon after trade date, it may not be possible to fully reclaim the structuring spread priced into the transaction on exit

Overview of calculation methodology The Day 1 P&L will be amortized into P&L over a specified time period of not more than 12 months.

Frequency of recalculation	Recalculated in line with amortization schedule
Product types	Structured FX trades with clients where there is a history of early termination
Conditions for release	Released in line with amortization schedule

7. Global Rates

7.1. Model Unapproved

7.1.1. Model Unapproved: Payoff language

Model Name MMLib formula evaluator

Model Status Temporary Approval

Description of trade type MMLib has an embedded script language that can be used to evaluate a formula associated with a coupon or cash flow. The review process of those trades is undergoing and the day 1 P&L is kept until it is finished.

Overview of calculation methodology The current adjustment is based on the Day 1 P&L
Frequency of recalculation Static

7.1.2. Released

7.1.3. Model Unapproved: Daily Inflation Index-linked swap

Model Name To be determined

Model Status Temporary Approval

Description of trade type Lehman pays the monthly index return if positive and receives -1* monthly index return if negative. Counterparty pays 1month GBP libor -15bps. The monthly index return is the total return of the Lehman Brothers Global Inflation linked UK Index. On each monthly observation date, the counterparty has the option to change the notional subject to a notional variation payment.

Global Id	Notional	Effective Date	Maturity	Counterparty
2862388	GBP6.9m	08/02/07	08/02/08	SGAM AI UK Bond inflation linked Alpha + fund

7.1.4. Model Unapproved: Inflation Range accrual

Model Name To be determined

Model Status Temporary Approval

Global Id	Notional	Effective Date	Maturity	Counterparty
2913751	50,000,000 EUR	09/03/2007	09/03/2012	CFCM
2910049	25,000,000 EUR	09/03/2007	09/03/2012	CFCM
3061745	100,000,000 EUR	05/06/2007	05/06/2012	IXIS Corporate
3407324 (3309785)	100,000,000 EUR	29/08/2007	05/06/2012	DePfa Bank
3323638	5,000,000 EUR	01/09/2009	01/09/2024	BRED – Banque Populaire (French Inflation range)

7.1.5. Model Unapproved: Autoredeemable

Model Name HJM

Model Status Temporary Approval

Description of trade type Autoredeemable Range accruals

Conditions for release Migration Q1 2008

Global Id	Notional	Effective Date	Maturity	Counterparty
3063993	2,500,000 EUR	23/05/2007	23/05/2017	Cassa Di Risparmio di Cento SpA

7.1.6. Model Unapproved: EURIBOR capped at inflation

Model Name To be determined

Model Status Temporary Approval

Description of trade type Lehman pays the monthly index return if positive and receives -1* monthly index return if negative. Counterparty pays 1month GBP libor -15bps. The monthly index return is the total return of the Lehman Brothers Global Inflation linked UK Index. On each monthly observation date, the counterparty has the option to change the notional subject to a notional variation payment.

Rationale Lehman Brothers entered EUR50m swap on April 2016 where we pay 6mEURIBOR+65bps subject to a cap of 2.5 $* \frac{CPI_{Final} - CPI_{Initial}}{CPI_{Initial}}$ and floored at zero. Lehman Brothers receives 3mEURIBOR+28bps. The valuation is therefore sensitive to the correlation between inflation rates and interest rates.

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation Static [to be updated with parametric methodology]

Product types Global 2453677 / 2453860 Book 120

Conditions for release Elimination of risk

7.1.7. Model Unapproved: Proxy bookings

Model Name Various

Model Status Temporary Approval

Description of trade type

Rationale

Overview of calculation methodology The current adjustment is based on the Day 1 P&L
Frequency of recalculation Static [to be updated with parametric methodology]

Product types

Global Id	Notional	Effective Date	Maturity	Counterparty	Proxy Booking
Livret A trades 3862371	€2.35m	02/06/08	02/06/2023	BRED	1) use an approximation of the EONIA curve (See section on EONIA curve Approx) 2) E3M should be average of December, but take December 15 rate 3) Inflation volatility is hard coded

Conditions for release Migration to proper model

7.1.8. Model Unapproved: Lens Booking

Model Name HJM

Model Status Temporary Approval

Description of trade type

Rationale HJM model not able to deal with trades feature

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation Static

Product types Various types: 3552296 / 3567692 / 3586611 / 3625137 / 3567837

Conditions for release Migration to proper model (mid September)

7.1.9. Released

7.2. Model Barrier Shift:

Rationale Digital risk trades suffer from distorted delta and gamma risk at or near the strike. In order to risk manage this impact a barrier shift is applied to smooth the discontinuity. This is standard practice in the market and the fair value of digital type trades will include an adjustment for barrier shift (alternatively known as call spread).

Overview of calculation methodology An example is a coupon subject to the condition that if 6 month Euribor is above 3%, then the coupon is 4% otherwise the coupon is 2%. The trade is booked as (1) counterparty trade where Lehman is short cap with a strike of 3% (2) dummy trade where Lehman is long cap with a strike of 3% and (3) dummy trade where Lehman is short cap with a strike of 2.95% (5bps barrier shift). Therefore from a risk and balance sheet valuation perspective we are short a cap with a strike of 2.95% - when the fixing is below this strike, the 5bps of barrier shift will be recognized as positive gain. Product control can quantify the impact by subtracting the valuation on the dummy trade (3) from the valuation of the client trade (1).

Frequency of recalculation This is not currently recalculated. The valuation adjustment is embedded in the MTM. As of end of September 2007 the estimation is 10 millions. Some IT solution needs to be developed to be able to reassess this valuation adjustment.

Product types All trade types with digital risk

Conditions for release Barrier shifts will be reviewed to market levels to determine appropriateness and only when approved by model validation and product control will be changed. Barrier shifts can be removed either when trades mature or when there is a methodology to properly handle risk management numbers for trades with digital payouts.

7.3. Model Approximation

7.3.1. Model Approximation: Decorrelation Reserves for Escalators

Model Markov Functional Model

Model Valuation Adjustment Approval Date 30th March 2007

Rationale The effect of de-correlation can only be properly taken into account by using a model with a large number of factors (in the range 5 – 10 factors). The Markov Functional Model allows for the modeling of one or two factors only.

Overview of calculation methodology The effect of de-correlation can only be properly taken into account by using a model with a large number of factors (in the range 5 – 10 factors). Such a model would by necessity need to use Monte Carlo simulation with the associated possibility of less reliable sensitivities and computational speed issues. For the avoidance of doubt, if the 1- factor Markov Functional Model is the most conservative, then no valuation adjustment is required. However, it is not practical to calculate a dynamic de-correlation adjustment based on the difference in valuation between such a large- factored Monte Carlo model and the current trade booking and therefore a dynamic proxy adjustment of 2 Vega is taken.

Frequency of recalculation Calculated monthly by the desk

Product types This model reserve needs to be taken in conjunction with all escalator products which use the Markov Functional Model

Conditions for release Implementation of multi-factor model

7.3.2. Model Approximation: Decorrelation Reserves for TARN

Model Markov Functional Model

Model Valuation Adjustment Approval Date 9th February 2007

Rationale The Markov Functional Model allows for the modeling of one or two factors only. Under certain conditions (please see model reserve scope below), a one or two factor model will consistently over- price products with TARN features because such a model cannot provide realistic de- correlation between rates. The occurrence of such an overpricing can be illustrated as follows. When paying the exotic leg, conditions under which early redemption is postponed add value since a greater number of funding flows are received and the target return is paid out over a longer time. Under the conditions outlined below, increases in the index rate underlying the exotic coupons will delay early redemption and will lead to a higher present value for the remaining funding leg for a one (or two) factor model as compared with a large factored model which exhibits realistic de-correlation. On the other hand, a decrease in this index rate will accelerate early termination. The impact of such a time shortening is however lessened with a one or two factor model (as compared with a large factored model) since smaller Libor flows would have been received anyway. Consequently, there is a bias when the exotic coupon is being paid and a one (or two) factor model is being used and this bias requires model reserves.

Overview of calculation methodology The effect of de- correlation can only be properly taken into account by using a model with a large number of factors (in the range 5 – 10 factors). Such a model would by necessity need to use Monte Carlo simulation with the associated possibility of less reliable sensitivities and computational speed issues. For the avoidance of doubt, if the 1-factor Markov Functional Model is the most conservative, then no valuation adjustment is required. However, it is not practical to calculate a dynamic de-correlation adjustment based on the difference in valuation between such a large- factored Monte Carlo model and the current trade booking and therefore a dynamic proxy adjustment of 2 Vega is taken.

Frequency of recalculation Calculated monthly by PC

Product types This model reserve needs to be taken in conjunction with all products with a TARN feature which use the Markov Functional Model and for which (1) The position is short the exotic leg (i.e. we are paying the exotic leg and receiving the funding leg); and (2) the coefficient of the exotic coupon index rate (Libor rate or CMS rate) is negative. At the moment this applies to the following two trades:

Conditions for release Usage of a model with a large number of factors

7.3.3. Model Approximation Decorrelation Reserves for Payoff trades

Model Brace- Gatarek- Musiela

Model Valuation Adjustment Approval Date 30th March 2007

Rationale The effect of de-correlation can only be properly taken into account by using a model with a large number of factors (in the range 5 – 10 factors).The Markov Functional Model allows for the modeling of one or two factors only.

Overview of calculation methodology The effect of de-correlation can only be properly taken into account by using a model with a large number of factors (in the range 5 – 10 factors). Such a model would by necessity need to use Monte Carlo simulation with the associated possibility of less reliable sensitivities and computational speed issues. For the avoidance of doubt, if the 1-factor Markov Functional Model is the most conservative, then no valuation adjustment is required. However, it is not practical to calculate a dynamic de-correlation adjustment based on the difference in valuation between such a large- factored Monte Carlo model and the current trade booking and therefore a dynamic proxy adjustment of 2 Vega is taken.

Frequency of recalculation Calculated Monthly by the desk (need to be explicit)

Product types This model reserve needs to be taken in conjunction with all products which use the payoff language and that are not using the requested number of factors. Please see Payoff language spreadsheet for further details.

Conditions for release Implementation of multi-factor model.

7.4. Model Fit

7.4.1. Model Fit: Bermudan Callable swap

Model QBermudanSwaption

Model Valuation Adjustment Approval Date Historical

Rationale The model is not arbitrage free

Overview of calculation methodology We reserve the difference between the non arbitrage free model (QBermudanSwaption) and the Sali tree using the ELV calibration. Because the calibration is not deemed to be stable enough to be used in production we calculate this difference monthly. This is basically taking the Sali tree as the official model. Please do note that a skew adjustment is also necessary for the Sali tree and is calculated as per the other instrument types using a Sali tree.

Frequency of recalculation Monthly by IT

Product types Vanilla Callables

Conditions for release Stability of calibration

7.4.2. Model Fit: Bermudan Inverse Floater

Model HJM

Model Valuation Adjustment Approval Date Historical

Rationale

Overview of calculation methodology Day 1 P&L.

Frequency of recalculation Static

Product types Bermudan Inverse Floater

Conditions for release Migration to new model (Q4 2008)

Global Id	Notional	Effective Date	Maturity	Counterparty
2276694	100,000,000 EUR	31/10/2005	31/10/2025	Dexia credit Local

7.4.3. Model Fit: EUR/USD Quanto BMA Muni Note

Model Name Quanto BMA

Model Valuation Adjustment Approval Date Under Review

Rationale The model is not accounting for the quanto features.

Overview of calculation methodology ¼ delta + ½ vega

Frequency of recalculation Monthly by PC

Description of trade type Lehman pays a coupon of 7.00% + 10 × (65% × 3mUSD LIBOR – Average BMA Rate) subject to minimum of 0% on a notional of EUR30m in Euros.

Global Id	Notional	Effective Date	Maturity	Counterparty
2862335	EUR30m (USD39m)	23/02/07	23/02/17	Lehman Treasury
3283830	11,275,000 EUR	16/04/2008	16/04/2020	Lehman Bankhaus

Conditions for release New Model

7.4.4. Released

7.4.5. Model Fit: CMS Spread Range Accruals and steepeners

Model ????

Model Valuation Adjustment Approval Date Historical

Rationale ???

Overview of calculation methodology Day 1 P&L.

Frequency of recalculation Static

Product types CMS Spread range accruals and Steepeners

Conditions for release Need to be reviewed. Migration.

7.4.6. Model Fit: released

7.4.7. Released

7.5. Model Skew

7.5.1. Model Skew: Interest Rate Volatility Skew for Products on the Markov Functional Model

Model Markov Functional Model

Model Valuation Adjustment Approval Date 12th January 2007

Rationale Volatility skew is modeled in the Markov Functional Model through a shifted parameter Q although volatility smiles (which display increasing volatility with increasing strike in the high strike regime) cannot be achieved within such a parametrically shifted model. The shifted parameter Q can be used to capture volatility smirks but calibration is not internal to the model. Instead, the shifted parameter Q is a direct input to the model and must be specified by the model user.

Overview of calculation methodology The interest rate skew reserving methodology for products using the Markov Functional Model consists in identifying the probability distribution which would lead to the most conservative pricing for each trade and then reserving the difference in valuation with the actual trade booking. In practice, this means that the shift parameter Q must be varied between the lognormal case (Q = 1) and the normal case (Q = 0) to identify the most conservative price associated with each trade.

Frequency of recalculation Monthly report produced by IT

Product types All products on Markov Functional Model [Tarns, Snowballs, Inverse Floater Tarns, Snowblades, Callable Fixed Range Accruals]

Business BPM2/ Book Book 120

Conditions for release Price testing of skew

7.5.2. Model Skew: CMS Rate-Rate Correlation Skew (except EUR)

Model Valuation Adjustment Approval Date 26th October 2007

Rationale The exotic options book has a large portfolio of spread options where the two underlying assets are CMS rates. An example payout is Max[CMS10 – CMS2 - K, 0]. Prices, and therefore implied correlations, depend on the pair of rates (e.g. 2s10s, 10s30s) and the strike (e.g. 1%, -1%). Liquidity also depends on the pair and the strike. Most inter-broker prices are for strikes around zero or ATM. We have a valuation adjustment on the outright correlation exposure.

Overview of calculation methodology We use a report calculated by our P/L systems that shows the correlation risk for each strike. This is calculated by revaluing the portfolio after bumping the correlation for one pair of rates (e.g. 2s10s), in one time bucket (e.g. between 0 months and 6 months), and in one strike window (e.g. 0.00% - 0.05%). This is repeated to build up a map of the correlation risk per pair, per strike, per expiry.

A valuation adjustment is made as we move away from ATM, based on (Distance from Strike in bp)^2 * 10. Therefore, for a strike 100bp away from ATM we take a reserve of 10 correlations points. PC periodically review the skew using market quotes.

This methodology is in place until the implementation of a correlation skew surface.

Frequency of recalculation Monthly

Product types CMS Rate-Rate products with caps and floors

Conditions for release Implementation of correlation skew surface.

7.5.3. Model Skew: CMS Rate-Rate Correlation Skew EUR

Model Valuation Adjustment Approval Date TBD

Rationale

Overview of calculation methodology

This methodology is in place until the implementation of a correlation skew surface.

Frequency of recalculation Monthly

Product types CMS Rate-Rate products with caps and floors

Conditions for release Implementation of correlation skew surface.

7.5.4. Model Skew: Min-Max Volbond Model Skew

Model Min-Max Volbond Model

Model Valuation Adjustment Approval Date 19/2/08

Rationale The Min-Max model is used to price transactions where there are payments made based on the difference between the maximum and minimum values of a variable (ie a swap rate) over a finite set of observations points, defined as the observed range. This range is then subject to leverage or cap and floor conditions. Valuation uses a lognormal model with a specified shift, s, for the forward rates; s is chosen at zero. When s is large, the valuation of a geared range with a cap and a floor is less favorable, which this valuation adjustment is addressing.

Overview of calculation methodology 1 vega is taken as a proxy for a shift in the s parameter. This will be reviewed annually.

Frequency of recalculation Monthly

Product types Min-Max trades where we are paying the capped geared range.

Business BPM2 / Book Book 124 – Options Exotics

Conditions for release Close out of transactions

7.5.5. Model Skew: CPPI Interest Rate Volatility Skew

Model FunOpt4

Model Valuation Adjustment Approval Date

Rationale The model does not capture Interest Rate volatility skew. In many CPPI products, Lehman is short an out-of-the-money interest rate option, which pays out if interest-rates move down. The current model assumes a flat volatility across all strikes, and this creates a bias in the model. This effect is important especially for trades with a fixed or a "best of" FIC. However, it also has an impact for trades with a floating FIC, because if interest-rates move down, a CPPI trade will become more risky.

Overview of calculation methodology To estimate the impact of this, we divide our attention between fixed and "best of" FIC trades, and the others. For the former, the current value of the fixed FIC will imply a certain level of rates. This value is the effective strike of the embedded interest rate option. We calculate it by assuming a flat curve, and calculating the value of the (single) rate which gives the same FIC value. We then compare this to the single value which reproduces today's discount factor. The difference between the two rates is our deviation from the at-the-money level. To calculate the corresponding shift in volatility, we calculate the at-the-money implied co-terminal swaption volatility with option maturity halfway through the trade. We then calculate the implied volatility with a strike modified by the shift calculated previously. The difference in these two values is our volatility deviation from the at-the-money level. We then use the interest rate vega of each trade to calculate the valuation impact.

For other trades, we estimated the mean value of interest rates at which the trades tend to knock out. We took a typical trade, and found this to be around 50 bps less than the at-the-money level. We use this fixed amount for all other trades.

Frequency of recalculation	Quarterly by Product Control
Product types	All CPPI products
Business BPM2/ Book	Capital Market Funds JV
Conditions for release	New model calibrated to skew that replicates prices for non at-the-money strikes

7.5.6. Model Skew: Inflation Volatility skew

Model	
Model Valuation Adjustment Approval Date	Not approved
Rationale	
Overview of calculation methodology.	Day 1 P&L released 10% every year
Frequency of recalculation	Yearly
Product types	Inflation Cap CMS
Conditions for release	

7.6. Model Calibration

7.6.1. Model Calibration: Calibration Adjustment for Callable Fixed Range Accruals

Model Markov Functional Model (1-Factor with Sali Tree Methodology)

Calibration Methodology Index Co-Terminal with the range index tenor specified as the calibration parameter.

Model Valuation Adjustment Approval Date 27th September 2006

Rationale Index Co-terminal calibration is used for callable range accruals as the underlying is dependent on the volatility of the observation index. Index Co-terminal calibration is not used for fixed-floating Bermudan swaptions (ELV is used – this is similar to CLV Co-Terminal Local Volatility but with a correction for skew) because the forward volatility is too high close to the expiry of each rate meaning that it overprices the switch value (Bermudan versus maximum European value). Therefore there is a contradiction – when the range is unlikely to be breached, a callable range is the same as a callable fixed-floating Bermudan. The IC calibration therefore overprices the switch value for the call in the callable ranges.

Overview of calculation methodology 1 vega

Frequency of recalculation Monthly

Product types Callable fixed range accruals

Conditions for release

7.6.2. Released

7.7. Bid-Offer

7.7.1. Bid-Offer Correlation: CMS Rate-Rate Correlation

Rationale The CMS Rate-Rate product has a cash flow dependent on the difference between two different term CMS rates subject to a floor (for example, pay (10Y Euro CMS less 2Y Euro CMS) subject to a floor of zero. There is interest-rate term correlation between the different CMS rates. The net correlation risk is marked at mid and therefore a bid-offer adjustment is required.

Overview of calculation methodology The bid offer spread is calculated using either (1) actual bid-offer or (2) 2 standard deviation of a 5-year time series of the rate pair, where the correlation variable is calculated over 6-month periods in order to produce a sample of 10 observations. The correlation risk is taken from RAT for the rate-rate pairs. However, for certain non-liquid pair risk we convert the risk into an equivalent liquid pair risk. For example, a trading book only has risk to vol and correlations for the pairs 2y10y, 10y30y, 2y30y. The objective is to map the less liquid 2y10y and 10y30y pairs to the relatively liquid 2y30y pair (which comprises the majority of current risk in the book).

1. Calculate the bp vol for 2y, 10y and 30y.
2. Calculate correlations for 2y10y and 2y30y.

3. Calculate portfolio vol for 2y10y and 2y30y using bp vol and correlation
4. Correlation for 2y10y versus 2y30y = 97.7%
5. We can express the spread vol of 10y30y in terms of the component volatilities and correlations for 10y and 30y.
6. Partially differentiate w.r.t. correlation 2y10y and compute the 2y10y delta for 10y30y. Therefore the 10y30y correlation risk * delta = 2y10y correlation risk.

Frequency of recalculation	Monthly by Product Control
Product types	CMS Pairs
Conditions for release	Elimination of CMS Pair Delta Risk

7.7.2. Bid-Offer Delta: TEC10 Rate Delta

Rationale TEC10 is the yield on 10y French Government debt and it is closely linked to the yield on CMS10. The TEC10 is marked as a spread to the CMS10 yield. This risk is not considered to be fungible with other interest-rate risk therefore a separate bid-offer is maintained

Overview of calculation methodology The bid offer spread is assumed to be 4bps, therefore an adjustment of 2bps is applied to the net TEC10 risk. We do not apply maturity bucketing

Frequency of recalculation	Monthly by Product Control
Product types	TEC10 products
Business BPM2/ Book	Book120
Conditions for release	Elimination of TEC10 net delta risk

7.7.3. Bid-Offer Delta: High Strike CMS Caps

Rationale Currently our Models ends up mispricing the high strike CMS CAPS due to our model overvaluing high strike payer swaptions. This is a well-known feature of the SABR model. We use a swaption replication model to price cms caps - using our SABR surface to price a basket of high strike payer swaptions. To price a cms floor in our replication model we use a portfolio of low strike receivers - our model does not mis-price these options as it does for the high strike caps.

An example of the pay off would be something like

Pay 85% × 10Y EUR SWAP, with minimum of 2.00% and maximum of 7.00%

Rec 6m EURIBOR + 0.097%

In this we are long the CAP @ strike of 7%. Since the models end up marking them up, we need to reserve for this. Until now the reserving was done on a static basis, where we held out the Day 1 P&L on these trades. To move onto a more dynamic approach it is proposed to have the reserve inbuilt within the trade itself by way of a barrier shift.

Overview of calculation methodology The implementation of the strike shift is based on 2 steps

1. Identify the population of the High Strike CMS within the book based on a code run by IT from RAT

2. Price Test the Levels to the broker Quotes available.

At the moment with the broker quotes available, and we price tested 8% CAPS with 5y and 10y maturity and the barrier shift requirement was 0.5% on such trades.

Example

For instance, 10y CMS10 8% caps were marked at 16.5c in March, while the brokers quoted 8.7c.

10yCMS10 9.5% caps marked at 8.7c in our system, so we used a barrier shift style of dynamic reserve, with a,b,c files.(a: 8%, b: 8% opposite direction, c. 9.5%)

In July VoV was remarked twice in the last 10 days and 10y CMS10 caps currently trade around 30c. We mark this in the system at 38.5c

Using the same dynamic reserve methodology, this would correspond to a strike of 8.5%, i.e. a shift of 0.50% instead of 1.5% earlier.

Frequency of recalculation	Quarterly by Product Control (script written by IT to ensure completeness of population)
Product types	High Strike CMS CAPS
Conditions for release	Models able to price these CAPS with appropriate skew effect to match the market prices.

7.7.4. Bid-Offer Delta: Inflation Rate Delta

Rationale Net inflation delta risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology Exposures for each inflation index are bucketed into the following maturity buckets: 0-2 years, 3-6 years, 7-11 years, 12 -16 years and 17 years onwards. Market bid/offer spreads for each maturity are observed from independent broker sources. The net inflation spread PV01 for each maturity bucket is multiplied by half the observed market bid/offer spread to give the bid/offer adjustment for that maturity bucket. The sum absolute of the bid/offer adjustments calculated in this way constitutes the total bid/offer adjustment for that inflation index. The sum absolute of the different inflation index bid/offer adjustments constitutes the total inflation rate bid/offer adjustment requirement.

Frequency of recalculation	Monthly by product control
Product types	All products with inflation yield curve risk
Conditions for release	Elimination of inflation delta risk

(Waiting for CC)

7.7.5. Bid-Offer Delta: Interest Rate Delta

Rationale Net interest rate delta risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology Exposures for each currency are bucketed into the following maturity buckets: 0-2 years, 3-6 years, 7-11 years, 12-16 years and 17 years onwards. Market bid/offer spreads for each maturity are observed from independent broker sources. The net PV01 for each maturity bucket is multiplied by half the observed market bid/offer spread to give the bid/offer adjustment for that maturity bucket. The sum absolute of the bid/offer adjustments calculated in this way constitutes the total bid/offer adjustment for that currency. The sum absolute of the different currency bid/offer adjustments constitutes the total swap rate bid/offer adjustment requirement.

Frequency of recalculation	Monthly by product control
Product types	All products with interest-rate yield curve risk
Conditions for release	Elimination of interest-rate delta risk

7.7.6. Bid-Offer Vega: Interest Rate Vega

Rationale Net interest rate vega risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology Exposures for each currency are bucketed into the following maturity buckets: 6 month options into 10 year swaps, 5 year options into 5 year swaps and 10 year options into 20 year swaps. The allocation of a particular exposure to a bucket is through beta factors provided by the desk which estimate the correlation of each more granular exposure point to each of the three overall buckets. Market bid/offer spreads for each maturity are observed from independent broker sources. The net vega for each maturity bucket is multiplied by half the observed market bid/offer spread to give the bid/offer adjustment for that maturity bucket. The sum absolute of the bid/offer adjustments calculated in this way constitutes the total bid/offer adjustment for that currency. The sum absolute of the different currency bid/offer adjustments constitutes the total volatility bid/offer adjustment requirement.

Frequency of recalculation	Monthly by product control
Product types	All products with interest-rate volatility risk
Conditions for release	Elimination of interest-rate volatility risk

7.7.7. Bid-Offer Vega: Inflation Vega

Rationale Net interest rate vega risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology Exposures for each currency are bucketed into the following maturity buckets: 6 month options into 10 year swaps, 5 year options into 5 year swaps and 10 year options into 20 year swaps. The allocation of a particular exposure to a bucket is through beta factors provided by the desk which estimate the correlation of each more granular exposure point to each of the three overall buckets. Market bid/offer spreads for each maturity are observed from independent broker sources. The net vega for each maturity bucket is multiplied by half the observed market bid/offer spread to give the bid/offer adjustment for that maturity bucket. The sum absolute of the bid/offer adjustments calculated in this way constitutes the total bid/offer adjustment for that currency. The sum absolute of the different currency bid/offer adjustments constitutes the total volatility bid/offer adjustment requirement.

Frequency of recalculation	Monthly by product control

Product types	All products with interest-rate volatility risk
Conditions for release	Elimination of interest-rate volatility risk

7.8. Reserve Released

7.9. Contractual Early Termination Valuation Adjustment

7.9.1. Contractual Early Termination Valuation Adjustment: Compass /iVTS/DARTS

Rationale In the termsheet of the COMPASS trades, iVTS and DARTS , some early termination conditions are clearly stated hence we need to include those as part as our MTM.

Overview of calculation methodology Overview of calculation methodology The revenue recognition on these trades is linked to the administration fee to be received on these structures, which in turn is a factor of the termination possibility and the benefit receivable by us on such termination. For each trade that have early termination fees, we are calculating what fees we are sure to receive whether the trade is on until maturity or whether it is early terminated (we take the most conservative assumption). We are re-pricing those fees quarterly in Optmodel.

Frequency of recalculation	Quarterly by product control
Product types	COMPASS involves entering into a duration-weighted pair of USD forward-starting 10-year and 2-year swaps, which are rolled forward at the end of each quarter. The steepening or flattening position employed by the Strategy will be determined by reference to the change in the Fed Funds target rate over the 3 month period prior to the start of the Calculation Period. This is intended to take advantage of trends in the shape of the yield curve following the Federal Reserve rate cycle; so that the position is +1 (steepening) during a period of stable or falling short-term rates and -1 (flattening) during a period where short-term rates have been rising. iVTS is a strategy based on exploiting the observation that implied interest rate volatility has tended to be be higher than realised interest rate volatility. Once a month a 1m 10yr swaption Straddle is sold and then Delta hedged over the month with interest rate swaps. This means the interest rate Delta is hedged during the month and the transaction performance is determined by the realised volatility compared to the implied volatility traded. At the end of the month the trades are unwound and the return for the month is determined. DARTS index trades long or short positions in Futures (USD, EUR, GBP, JPY) based on the signal given by the Duration Scorecard (which is a proprietary signal published weekly for each of the ccy). The Duration Scorecard aims to identify investment opportunities in a timely manner to exploit predictable variations in bond excess returns.
Conditions for release	Close-out of risk exposure

7.9.2. Contractual Early Termination Valuation Adjustment: CPPI

Rationale The CPPI structures within our Fund Derivatives portfolio contain standard terms that provide early termination provisions to our clients. This is a contractual obligation on our part. The specific terms vary from trade to trade, but each has penalty clauses that provide Lehman some element of protection against loss of future fee steams in the event of an early termination. The contingent nature of these fee streams is not currently reflected in our valuation adjustment calculations. To better reflect the potential economic effect of an early termination event the Firm has developed a model for calculating the ETA required. The model takes into account the parameters of each trade which include the fee income stream and unwind fees over the life of the trade. For each trade, the model calculates the maximum potential loss to Lehman if the client unwinds the trade.

The following factors need to be considered in the event of a client electing to early terminate a deal (1) Lehman will not receive fees beyond the unwind date (2) Lehman may be liable for 'wrapper' fees to a third party, the credit enhancing entity, to make good any losses incurred up to a pre-determined date (3) Lehman may be compensated by a discount clause i.e. unwind fee. The discount fee, if it exists, will be documented in the term sheet and (4) the option booked in Lehman's books will be unwound. Lehman's potential loss at any date is the net of these factors.

Overview of Calculation Methodology The model calculates the maximum potential loss at model implementation date. This loss is calculated as:

Loss=Minimum ((-PV Fees payable to Lehman - PV Wrapper Fees - PV Option + Discount),0)

If trade terms do not allow the trade to be unwound before a certain date, then the model calculates a zero ETA before that date. The ETA will be amortized on a straight line basis over the life of the trade, from implementation date until maturity date.

Frequency of recalculation	Quarterly by Product Control
Product types	All CPPI trades with contractual Early Termination provisions
Business BPM2/ Book	Capital Markets Fund JV
Conditions for release	Modeling of the early termination breaks

Capital Market Funds JV

7.10. Parameter Uncertainty

7.10.1. Parameter Uncertainty: 15-year+ EUR HICPexTobacco inflation volatility

Rationale Lehman has entered into a series of convexity swaps to fund the coupon on SPV note issuance. The note coupon is linked to the European inflation index "HICP exTobacco". The nth coupon is defined as Max {0, [(Weightn x 3.535%) + (1 - Weightn) x 12m EURIBOR x (365/360)]} where Weight = 1 +(3 x [1.03n – HICP ratio]) and HICP ratio = rate of annual inflation. Lehman funds the SPV for the coupon on the bonds and receives the libor coupon from the underlying collateral held by the SPV. The floor on the bond coupon (to protect investors from the impact of deflation) means that Lehman is effectively short an inflation floor. It was

demonstrated in February 2006 to CDTR that inflation volatility is observable to 15years. Therefore there is uncertainty whether the inflation volatility marks for maturities greater than 15-year represent a true exit price.

Overview of calculation methodology For inflation risk greater than 15-year, IR-Inflation correlation beyond 15 years is remarked to 0. This eliminates the inflation vega and creates a P&L impact. Correlation value is re-instated using the Correlation'01 risk to generate the net valuation impact.

Frequency of recalculation	Monthly
Product types	Inflation floor
Business BPM2/ Book	Book 214
Conditions for release	Elimination of 15-year + inflation volatility risk

7.10.2. Parameter Uncertainty: EUR Interest-Rate – EUR Inflation Correlation

Rationale Lehman has executed a number of trades where standard fix/float interest-rate coupons are factored by an inflation-rate linked weight (1-HICP). For example, a pay fixed / receive float swap will have a first-order sensitivity to interest-rate movements – an increase in interest-rates would generate positive MTM due to the short PV01 risk. If there is positive correlation between interest-rates and inflation-rates then inflation-rate increases and the weight term on the coupons will decrease. The decreasing weight term will reduce the short PV01 risk. This second-order effect has resulted in these trades being known as "convexity trades". The correlation between interest-rates and inflation can be observed historically and implied in a limited number of cases where these types of trades are executed.

Overview of calculation methodology The correlation is currently marked at 15%. Based on the evidence of bid-offer levels, a parameter uncertainty adjustment is taken that represents the worst-case impact from marking to 0% mid-correlation or 30% mid-correlation across the absolute correlation risk within the 0-11yr and 12yr+ buckets.

Frequency of recalculation	Monthly by product control. Correlation boundaries to be reviewed quarterly
Product types	Convexity trades
Business BPM2/ Book	Book 124
Conditions for release	Elimination of correlation risk

7.10.3. Parameter Uncertainty: Long-dated CMS swap

Rationale Lehman has executed a swap with Banque Federative du Credit Mutuel maturing in 2057 where it pays Min [10Y Eur CMS+10bps, 8%] and receives 3month Euribor + spread. There is no observability in the market for CMS volatilities at this maturity.

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation	Static [to be updated with parametric methodology]

Product types	2040331 with BFCM until 2044 (255mm EUR) 2078178 with BFCM until 2045 (85mm EUR) 3054209 with CFCM until **2057** (250mm EUR) 3054046 with Meryll until 2044 (113mm EUR)
Business BPM2/ Book	Book 120
Conditions for release	Observable long-dated CMS volatility

OC to come back with dynamic methodology

7.10.4. Parameter Uncertainty: Liquidity gating reserves for Fund Derivatives

Model FunOpt4

Model Valuation Adjustment Approval Date 12th December 2006

Rationale The current Fund Derivatives pricing model takes into account liquidity restrictions on the underlying funds. Indeed, this is a key component of the gap risk taken on by the desk, as these restrictions could mean that the desk cannot sell out of a fund quickly enough before incurring a loss. The model uses Monte Carlo as a way to calculate the gap risk on a given trade: it simulates many paths of the underlying fund of fund, and calculates the payoff at maturity for each price to evaluate the value of the option. As regards liquidity, when at some point along a given path the model finds that it needs to buy or sell some fund units, it will place an order which will only be filled at some later stage in the simulation. Concretely, this can happen under two so-called "liquidity regimes":

- Partial liquidity regime: Under this regime, there are restrictions on both the size, as well as a delay after which orders are filled.
- Full liquidity regime: Under this regime, there is no size restriction on the order, but the delay is longer than under the partial liquidity regime.

In the real world, the liquidity profile of a fund of fund can be very complicated: typically a fund of fund will offer contractual liquidity terms, but this is usually conditional on being able to obtain sufficient liquidity from the underlying hedge funds. This is what we call "look-through" liquidity of a fund of fund. In practice the look-through liquidity profile may be very complicated, as the underlying funds of a given fund of fund may have a wide range of liquidity terms, that cannot be captured by the above simple two-regime model.

Another feature that the current fund derivative pricing model does not capture is the discretion held by some fund of fund managers to impose some gating on fund redemptions. This could occur for example if an investor asks to redeem a large amount of fund units, which represents a large amount of the total holdings of the fund of fund. In this case the fund of fund manager may have the ability to impose some additional delay to enable him to execute the request.

Overview of calculation methodology Estimating precisely the impact on pricing of these effects is difficult. As a proxy we simply stress the liquidity parameters of the existing model to a conservative level. A typical contractual liquidity delays for fund of funds is three months. When a fund imposes a gating, a typical situation is for the fund of fund to allow 20% of investors' holdings per month. This would result in a delay of five months to retrieve investments, which

corresponds to an increase in the delay of around 60%. To estimate the value of the reserve, we therefore stress both partial and full liquidity delays by 60%.

Frequency of recalculation Quarterly by Product Control

Product types All CPPI products

Business BPM2/ Book

7.10.5. Parameter Uncertainty: Lehman Aggregate Mirror Swap Index Option

Rationale Lehman sells a European put option on the Lehman Brothers Mirror Swap Index to ING Bank. The valuation is a function of the index return less a fixed performance variable. The index returns are denominated in USD, JPY and EUR and the deal is denominated in EUR. In order to proxy the performance of the forward return on the index, we model the swaps yield curves for USD, JPY and EUR, the FX rates for USD and JPY and the correlation between these parameters. The trade has been booked using the Option on Lehman Aggregate Index model. The model needs to generate an expected return based on assumptions around the future mirror swap returns. Therefore it needs to model interest-rate swap term structure, FX rate term structure and correlation between interest rate and FX rates. The model assumes fixed versus floating (libid) swap returns. It requires FX volatility and interest rate volatility to determine forward payoff under the Black formula. The correlation matrix is based on historical correlation between deposit interest-rates, swap rates and FX rates. It is not a significant input parameter (<10% valuation impact for a 2 standard deviation move in historical correlation) but there is sufficient uncertainty as to its true level that a valuation adjustment is taken.

Overview of calculation methodology 100k for each fixing remaining / 2

Frequency of recalculation Monthly by Product Control

Product types Global 506137

Conditions for release Exercise of option

7.10.6. Parameter Uncertainty: CPPI Gap Option Volatility

Rationale The desk risk manages the portfolio of options at levels of 10% - 14% and this is where the volatility is marked. In July 2007 the desk executed a number of cliquet put options in order to demonstrate the observability of the volatility. These were executed at implied volatility levels of 15.9%. As a result, the portfolio was remarked to 15.9%, which is where the majority of hedges were executed. Instead of performing this remark in the production system, the impact on the book was shown by way of a volatility adjustment for the gap between 10%-14% and 15.9%.

Overview of calculation methodology The volatility adjustment is calculated on a trade-by-trade basis.

Frequency of recalculation Quarterly by Product Control

Product types All CPPI products

Business BPM2/ Book Capital Market Funds JV

Conditions for release Liquidity to be deemed sufficient (subjective)

7.10.7. Parameter Uncertainty: Inflation-Interest-Rate beta factor

Rationale Lehman has executed a number of trades where standard fix/float interest-rate coupons are factored by an inflation-rate linked weight (1-HICP). For example, a pay fixed / receive float swap will have a first-order sensitivity to interest-rate movements – an increase in interest-rates would generate positive MTM due to the short PV01 risk. If there is positive correlation between interest-rates and inflation-rates then inflation-rate increases and the weight term on the coupons will decrease. The decreasing weight term will reduce the short PV01 risk. This second-order effect has resulted in these trades being known as "convexity trades". The correlation between interest-rates and inflation can be observed historically and implied in a limited number of cases where these types of trades are executed. The inflation-linked coupon has embedded floors that create inflation volatility risk. The inflation volatility is not directly observed but implied as a factor multiple of the interest-rate volatility. Inflation volatility = Interest-Rate volatility * Beta

Overview of calculation methodology The beta is currently marked at 75% based on the historical ratio of inflation volatility to interest-rate volatility. The beta is stressed to 100% and the absolute of the beta risk * (100%-75%) is taken as an adjustment against parameter uncertainty.

Frequency of recalculation	Monthly by product control.
Product types	Convexity trades
Business BPM2/ Book	Book 214
Conditions for release	Elimination of correlation risk

7.10.8. Parameter Uncertainty: FX-Interest-Rate correlation

Rationale: The Hybrid book has a swap linked to EUR/CHF and 10yr-2yr CMS Spread.
The payoff is Lehman pays 0% if (10Y EUR SWAP - 2Y EUR SWAP) >= 0.19% and EUR/CHF >= 1.5. Otherwise Lehman pays 4.5%. The model is assuming that the probability of the digital on EUR/CHF and the probability on the 10y-2y are independent. This means that the correlation between EUR/CHF and 10y-2y is set up to 0. We need to adjust the MTM to take into account this correlation until the booking can include this correlation component of the trade.
Calculation method: The desk is calculating the value of the trade by taking the Offer correlation from Bloomberg (since they sold correlation) and reserving the difference with the value of the trade currently booked.
Frequency of recalculation Quarterly by the desk
Product Types 3188096 (book 188)
Condition for release When trade matures or booking can be changed to reflect the correlation

7.10.9. Parameter Uncertainty: Hard Coded Correlation

Rationale The 120 book has a few trades where the correlation is hard coded in the booking.

i.e 1/ the payoff is (2Y EUR SWAP + 2%) x Index ratio where the spread in the index ratio is (10Y EUR SWAP – 10Y USD SWAP). The correlation between [10Y EUR SWAP and 10Y

USD SWAP] is hard coded at 80%, and the correlation between [the spread and 2Y EUR SWAP] is hard coded as zero.

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation Static

Product types

Global Id	Notional	Effective Date	Maturity	Counterparty	Payoff/correlation
3514418	19.5m EUR	17/12/2007	17/12/2009	Dexia credit Local	(2Y EUR SWAP + 2%)* index ratio w/ index: (10Y EU SWAP – 10Y USD SWAP) Correlation of spread is 80% Correlation spread vs. 2Y EUR SWAP: 0
3514249 (2140850)	50m EUR	20/05/2005	20/05/2015	Republic of Austria	(30Y EUR SWAP – 2Y EUR SWAP)>0.5% pay E6M Correlation E6M and spread: 0
3645342	12.5m EUR	15/02/2008	15/02/2013	HSH Nordbank	Range w/ index: (E3M – CHF LIBOR) Correlation between 2 curves: 75%
2349947	20m EUR	20/12/2005	20/12/2015	Hypo Tirol bank	E6M if (10Y EUR SWAP – 2Y EUR SWAP)>0 Correlation E6M and spread: -0.35
3963254	11m EUR	16/07/2008	16/07/2016	HSH Nordbank	0% if (3m Euribor arr – 3m CHF Libor arr)>1.30% else 5.00% Correlation E3M and 3m CHF Libor: 0.75

Business BPM2/ Book Book 120

Conditions for release No hard coded correlation in the booking

7.10.10. Parameter Uncertainty: EONIA Curve Approx

Rationale The 120 book has a few trades on which the underlying is the EONIA curve. This Curve is not in Optmodel and is approximated by using the 3M Euribor curve + spread (from Reuters)

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation Static

Product types 3618584, and Livret A trades (See unapproved Model: proxy trades), 3931321

Business BPM2/ Book Book 120

Conditions for release EONIA curve incorporated in Optmodel

7.10.11. Parameter Uncertainty: Vol of vol Volbonds

Rationale

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation Static

Product types

Business BPM2/ Book Book 120

Conditions for release

7.10.12. Parameter Uncertainty: Transatlantic Trades

Rationale

Overview of calculation methodology The current adjustment is based on the Day 1 P&L [new methodology to be determined]

Frequency of recalculation Static

Product types

Business BPM2/ Book Book 120

Conditions for release

7.11. Funding Cost

7.11.1. Funding Cost: Republic of Italy swap funding adjustment

Rationale The inflation swaps with the Republic of Italy represent a significant receivable (>$1bn) that will incur significant funding cost over the life of the portfolio of trades. This funding cost should be recognized today against the Day 1 P&L of the transaction to represent the true economic benefit of the transaction.

Overview of calculation methodology The funding cost adjustment is represented dynamically by booking two trades (dl-104630 and dl-104631) that reflect the expected funding cost adjustment for the Republic of Italy trades (1) cal7448, cal7454, cal7457 and (2) cal7503 respectively.

Frequency of recalculation Quarterly roll-forward of funding trade by Product Control

Product types Republic of Italy inflation swaps

Conditions for release The funding cost adjustment has been charged to the P&L on an upfront basis, therefore as the funding cost is accrued into the P&L through the normal process, the effective date of the funding trades are rolled forward to offset the charge. Practically, this roll forward is performed quarterly.

7.11.2. Funding Cost: Other funding adjustments

Rationale: Desks are charged by treasury for their usage of the balance sheet. If the MTM is in their favor they pay funding, if their MTM is in the client's favor they receive funding. On the trades that do not have collaterals the desk is holding out from the Day 1 P&L the amount of funding that they will get charged on those trades.

Calculation method: Apply the funding charge to the MTM (using the forward funding curve)
Product types 2196907 / 2886252 / 2870965 / 2936607 / 2952469 / 2960470 / 2970520 / 2683189 / 2973594
Condition for release: Termination of the trade

8. High Grade Credit

8.1. Bid-Offer Delta: Credit Spread Delta

Please refer to Valuation Adjustment: Fixed Income (Americas)

Sub topic: Bid-Offer Delta: Credit Spread Delta

9. High Yield

9.1. Bid-Offer Delta: Credit Spread Delta

Please refer to Valuation Adjustment: Fixed Income (Americas)

Sub topic: Bid-Offer Delta: Credit Spread Delta

10. Municipals

Not applicable for Europe.

11. Prop Trading

11.1. Bid-Offer Delta: Interest Rate Delta

Rationale Net interest rate delta risk is marked to mid therefore a bid/offer adjustment is required to adjust valuation to exit price.

Overview of calculation methodology Exposures for each currency are bucketed into the following maturity buckets: 0-2 years, 3-6 years, 7-11 years, 12-16 years and 17 years onwards. Market bid/offer spreads for each maturity are observed from independent broker sources. The net PV01 for each maturity bucket is multiplied by half the observed market bid/offer spread to give the bid/offer adjustment for that maturity bucket. The sum absolute of the bid/offer adjustments calculated in this way constitutes the total bid/offer adjustment for that currency. The sum absolute of the different currency bid/offer adjustments constitutes the total swap rate bid/offer adjustment requirement.

Frequency of recalculation	Monthly by product control
Product types	All products with interest-rate yield curve risk
Conditions for release	Elimination of interest-rate delta risk

12. Real Estate

No valuation adjustments taken in this business

13. Securitized Products

13.1. Credit

Provisions are held in the underlying mortgage subsidiary companies in respect of warehouse facilities where there is doubt as to the recoverability of the underlying debts. Mortgages in arrears are identified. Adjustments are made to the bad debts provision in the underlying mortgage subsidiaries as a result of these reviews.

13.2. Bid-Offer Delta: Credit Spread Delta

Please refer to Valuation Adjustment: Fixed Income (Americas)

Sub topic: Bid-Offer Delta: Credit Spread Delta

13.3. Bid-Offer Vega: Credit Vega

Rationale Credit volatilities are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology The credit vega risk is expressed in terms of pv impact per % vol. The sensitivity is netted by underlying credit risk and by option maturity. The bid-offer spread is taken from quoted market levels, and the reserve is calculated as:

Vega Bid-Offer Reserve = ∑ abs (Vega by option maturity) * Vol Mark * 100 * Bid-Offer Spread * ½

Frequency of recalculation	Monthly by product control
Product types	Credit Default Swaptions
Conditions for release	Close-out of risk exposure

13.4. Reputation and Warranty Reserve

A reserve of 10bp* the current SPV inventory is reserved against Reps and Warranties. This is booked in the local currency of the SPV inventory. This reserve is booked in the originating company at issuance. As the SPV inventory decreases, the reserve is reduced. This reserve is not booked where 100% of the bonds are retained at issuance.

14. Cash

14.1. Liquidity (Concentration)

Rationale For non-Level 1 positions there can be a lack of liquidity in the market meaning that a Liquidity (Concentration) adjustment is required to reflect the true exit price

Overview of calculation methodology Each stock position is compared to its 3 month average daily trading volume on Bloomberg. We believe that 20% of the average daily trading volume can be dealt into the market on any given day. The number of sell off days for each stock position greater than $20m market value is calculated by dividing each stock position by one fifth of its respective average daily trading volume. Where the number of sell off days exceeds one the 30 day historical volatility of the stock is derived from Bloomberg and converted to a standard deviation equivalent to the sell off period. The required liquidity provision for each stock is derived by multiplying the market value of the stock (obtained from an external source e.g. Bloomberg) by the standard deviation and halving the product. This is subject to a de minimis value of $1m. The sum absolute of the individual stock liquidity provisions calculated in this way constitutes the total liquidity provision requirement.

In exceptional cases Finance management may use its discretion to override the calculated provision, e.g. to limit the provision to an amount which in its opinion implies a realizable value.

Frequency of recalculation	Monthly by Product Control
Product type	Cash

Conditions for release Liquidation

15. Convertibles Product

15.1. Liquidity (Concentration)

Rationale For non-Level 1 positions there can be a lack of liquidity in the market meaning that a Liquidity (Concentration) adjustment is required to reflect the true exit price

Overview of calculation methodology The average of the prior three months' bid-offer spreads are taken from Bloomberg across providers for each position. Once the average spread has been established it is applied to the position and subject to a multiplier based upon the concentration of the position as follows:

Concentration	Multiplier
0-5%	nil
>5-15%	1
>15-30%	1.5
>30-45%	2.0
>45%	2.5

So the valuation adjustment is the sum absolute of Position x 0.5 x Average bid-offer x Multiplier.

Frequency of recalculation Monthly by Product Control

Product type Convertibles

Conditions for release Liquidation

16. Equity Strategies

No valuation adjustments taken in this business

17. Event Driven

No valuation adjustments taken in this business

18. Global Portfolio

No valuation adjustments taken in this business

19. Volatility

19.1. Bid-Offer Vega: Equity Volatility Bid-Offer

Rationale Equity volatilities are marked at mid. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of Calculation Methodology All option positions are grouped by underlying together with the related maturities and term vegas. Term vegas are allocated into the following time buckets for each underlying on a straight line basis: 0-1 year, 1-5 years and 5+ years, e.g. a 4

year option with a $100 term vega is allocated $25 to the 0-1 year bucket and $75 to the 1-5 year bucket. The net allocated vega for each time bucket is calculated. Market bid/offer spreads for each underlying and time bucket, or for a proxy where not available, are observed from independent sources, e.g. Bloomberg. The net vega for each time bucket by underlying is multiplied by half the observed market bid/offer spread to give the bid/offer adjustment for that time bucket. The adjustment for each underlying is the sum of its time bucket bid/offer adjustments. The sum of the bid/offer adjustments for all underlyings constitutes the total bid/offer adjustment requirement.

Frequency of recalculation	Monthly by product control
Product types	All equity options
Conditions for release	Close-out of risk exposure

Valuation Adjustment by BPM0: Global Principal Strategies (Europe)

20. Global Principal Strategies

Deleted

Valuation Adjustment by BPM0: Global Trading Strategies (Europe)

21. Global Trading Strategies

No valuation adjustments taken in this business

Valuation Adjustment: Fixed Income (Americas)

22. Interest Rate Products/Liquid Market Products/Foreign Exchange

22.1. Bid/Offer Adjustment

Product control maintains market value adjustments to convert from a mid-market valuation to a more market driven bid/offer basis where a particular business is required to close out positions or mitigate risk. Positions are marked to the conservative side of the market (bid/ask) at either the individual security or portfolio level. The bid/offer adjustment is maintained to quantify the expected cost of liquidating the portfolio. The types of risk to be considered for bid/offer adjustments are: interest rate, basis risk, and volatility.

For Rates and LMP, swap spread and basis risk exposures are bucketed by maturity. Market bid/offer spreads for each maturity are observed from independent broker sources. The absolute PV01 for each bucket is multiplied by half the observed market bid/offer spread to derive the bid/offer adjustment for that bucket. The only exception is for swap spreads. Quotations shown on the broker screens are much wider than experienced in the market. In this case, we take 0.5 bp instead.

Volatility risk is bucketed by short term, medium term and long term exposure based on the hedging effect of the exposure in that band. The volatility exposure in each bucket is highly correlated and can be used to mitigate the risk within that bucket. The absolute value of risk is used to quantify the requirement as we hold valuation adjustments on both long and short exposure. The bid/offer spread will be sourced from various brokers including but not limited to the following:

- Prebon Yamane
- Tullett and Tokyo
- ICAP
- Freddie Mac Daily Median for Euro and Amer Options

In the event that the published broker bid/offer spreads do not represent current market levels, product control will obtain more reliable bid/offer spread indications available from third parties through means other than the typical monthly sources. In the event quotes are unavailable for exposure for longer dated maturities on the curve, product control will extrapolate using last tenor available when calculating bid/ask spread. The actual valuation adjustment is computed by calculating ½ the difference between the bid/ask as quoted by brokers and apply that to the absolute value exposure.

In the FX market, convention requires dealers to quote a two way price (bid and offer) and clients can deal on either side. Clients also always expect the spread to be the same every time they are shown a price. (exceptions: extremely large size or quotes during large market moves).

The bid/offer spreads we apply are determined by the liquidity category we have assigned a currency pair and whether the risk is short dated or long dated. The spreads are agreed by both Product Control and the FX Desk. Spread for each liquidity/maturity category is essentially an average spread of all currency pairs within that category.

22.2. Liquidity Adjustment

Product control maintains a liquidity adjustment when the desk has exposure in less liquid markets or excessive risk on certain specific exposures. In such markets, actual bid/offer spreads tend to be larger, the time to close out a position may be longer, and the ability to close out may be limited. Currently, we are reserving an additional 0.75 Vega on long dated volatility exposure greater than 10 years. This requirement is based on discussions with the desk and external brokers. As in the bid/offer adjustment, we calculate ½ of the 0.75 bid/offer Vega and apply this to the absolute exposure for swaption and cap/floor.

22.3. Model Adjustments

Model reserves are taken when we need to model-to-market the Desk's exposure. This model-to-market is due to some degree of uncertainty in the existing model to provide a price that can be executed in the market. The necessity and the level of the Model Reserve Adjustment should be determined jointly by the Product Controllers, Risk Management and the trading desk. Periodic review of this adjustment should be made to ensure that the appropriate level of reserves is maintained.

For Interest Rates, it is not possible to represent the behavior of the term structure using a recombining tree in a path dependant model. Product control maintains a 0.25 Vega Bid/Offer reserve on HJM exposures, as HJM uses a path dependant model to value American and Bermudan options. The 0.25 Vega used to calculate the model reserve is based on conversations with Derivatives Technology, Fixed Income Research and Product Control. This level of reserves is reviewed periodically.

For FX Options, we maintain skew adjustments for exotics (barriers, etc) due to lack of proper skew pricing in the existing model. This calculation is performed using the OnePlus model which is a combination between a local and stochastic volatility model. The portfolio value is then adjusted on a daily/weekly basis to reflect correct skew.

22.4. Credit Adjustments

Where it is assessed that significant credit exposures are held (typically resulting from uncollateralized mark-to-market amounts), consideration should be given to raising credit adjustments. Credit adjustments represent the potential expected loss arising from counterparty default on obligations to the firm from financial instruments. The valuation adjustment methodology takes into consideration the expected value of counterparty default.

- Reserve for friction costs and correlation - The CVA desk pays transaction costs as it dynamically hedges. The amortization of the friction/correlation reserve mitigates the cumulative friction costs incurred by the dynamic hedging strategy. The default swap market becomes less liquid as a company deteriorates. Reduced liquidity is reflected in wider bid offer spreads and therefore increased frictional costs. This is addressed within the friction cost reserve by assuming that frictional costs are proportional to credit spreads. The CVA desk will therefore buy additional credit protection in order to hedge against an increase in cumulative frictional costs associated with a deterioration in the credit quality of the counterparty. Also, CVA dynamic hedging is indifferent to separate moves in credit spreads and FX (IR and Commodities), but is exposed to a simultaneous move in credit and FX.

The following steps highlight the calculation process for frictional and correlation reserves.

- Correlation and Friction reserves can be obtained directly from the CVA pricer by shifting the underling derivative forward curve according to the Quanto drift correction.
- Alternatively, the Quanto adjustment can be derived from the cross gamma profile of the trade.
- The CVA model provides an initial cross gamma.
- The reserve will be set with reference to the current cross gamma, the trade type and the maturity.
- The reserve will be amortized when it is recalculated monthly.
- A credit spread hedge will be held against the reserve.

Detailed calculations are as follows:

Friction and Correlation Shifts

Step 1, determine average expected correlation.

Step 2, shift the average correlation by 8% against the trade, to account for a risk premium/return on risk capital.

Step 3, shift correlation to account for frictional costs.

$$\Delta\rho = 0.4\gamma\sqrt{HF}$$

Where HF is the hedge frequency, γ is related to the expected CDS bid-offer:

$$Bid - Offer = \gamma S\sigma_S$$

Where S is the CDS spread and σ_S is the spread volatility.

Step 4, use the CVA model to calculate the cross gamma, Γ

Step 5, calculate the value of the combined correlation/friction reserve:

Cross Currency Swap, maturity T.

$$\Gamma_{FX,S} S\sigma_S FX\sigma_{FX}\rho\frac{1}{2}T$$

Interest Rate Swap

$$\Gamma_{IR,S} S\sigma_S IR\sigma_{IR}\rho\frac{1}{3}T$$

Commodity Swap

$$\Gamma_{C,S} S\sigma_S C\sigma_C\rho\frac{1}{3}T$$

- Reserve for liability benefit - 25% of liability benefit balance. The Lehman Liability Benefit values Lehman's right to default under a swap contract, in the same way that the

CVA values counterparty default risk. Recognition of liability benefit (and credit charges) is dictated by FASB and recent Tax Court rulings. The liability benefit corresponds to a funding benefit via hedging instruments. Funding is managed by market making desks separately. Aggregate institutional funding is managed by Treasury function. The funding benefit on the hedging instruments is subject to the 25% haircut.

22.5. Early Termination

As a general rule in valuations is what we show to clients should be reflective of the value we hold the position at in the books and records of Lehman. However, in the case of certain structured transactions an amount of initial P&L is reserved to provide against the cost of an early termination by the client, where the client would not be expected to suffer the full cost of the structuring expertise priced into the transaction.

The amount deferred is agreed by the product control manager and the desk at inception of the trade and is specific to each transaction, in general this should be the margin over and above any other reserve adjustments e.g. Bid Offer, Liquidity etc.

This reserve will be amortized, in a straight line manner, back to the P&L over a time no longer than 6 months, which recognizes that the risk of losing the initial spread diminishes over time and as the underlying moves. The exact time period will be agreed with Product control at inception.

This reserve would only be allowed for transactions with Day 1 P/L > 250K USD.

22.6. Deal Specific

When the need arises, trading desks will communicate to their respective Product Controllers the need to create a deal specific reserve. Their reasoning for these new reserves could include, but are not limited to, such reasons as inaccurate system for modeling new products, counterparty creditworthiness, or model deficiencies. Deal specific reserves will ultimately be excluded from the calculation of total Portfolio reserves.

The process for approval is as follows:

A) On the P&L date of the suggested new reserve, the amount will be held out as a Timing adjustment in the Trading desk's P&L.

B) The Trading desk will then need to provide a write-up, for which our Valuation Group will review it and decide whether or not they agree with the methodology.

The write-up will need to include the following:

i. Amount of reserve

ii. Related deal IDs

iii. Rationale for reserve

iv. Calculation methodology

v. Condition for release

C) If the Valuation Group agrees, the amount will be moved from Timing to Deal specific reserves and held out until the deal expires or until another suitable event takes place.

If the explanation is not valid or insufficient, the Trading desk will need to release the amount held out into P&L by the next month end date.

23. Credit

Credit product control maintains valuation adjustments to fair market value based on expected costs associated with maintaining or closing positions.

Valuation adjustment assumptions and methodology are subject to revision based upon changes in the market and product structure. Any assumption or methodology changes are approved by both the business head and the senior product controller. Where evidence is presented, policy exemptions can also be made to accommodate unique scenarios.

23.1. Bid-Offer Delta: Credit Spread Delta

Bid-Offer Delta valuation adjustment is instituted to bring the credit spread which is marked at mid level to the exit price level (bid/offer). It is calculated for credit default swaps and credit default swaptions on a credit-by-credit basis. Credit PV01 is netted across Global Credit Product for each issuer. The bid-offer adjustment for each issuer is calculated by multiplying the net credit PV01 and the weighted average spread of that issuer and 1/2 of the bid-offer percentage. Bid-offer percentage is defined as the ratio of bid-offer spread to mid credit spread. The sum absolute of the bid-offer valuation adjustments for each issuer constitutes the total bid-offer valuation adjustment. The adjustment is allocated to each trading book by issuer according to the absolute risks of each book in that issuer.

Credit Spread Reserve = ∑ absolute (net Credit PV01 by issuer) * weighted average credit Spread * bid-offer percentage* 0.5

The Bid-offer Delta valuation adjustment is calculated monthly by product control and reviewed monthly by the senior product controller.

For High Grade Business, we assume 10% bid-offer percentage for single name default swaps, 5% for sovereign single name default swaps, and 1 bp bid-offer spread for index products. For the purpose of calculating bid-offer delta valuation adjustment, weighted average credit spread is capped at 200bps for investment grade issuers and 300bps for non-investment grade issuers.

For High Yield & FID Corp Loan Business, we assume 5% bid-offer percentage for single name default swaps, and 3 bps bid-offer spread for index products.

23.2. Bid-Offer Vega: Credit Vega

Bid-Offer Vega valuation adjustment is instituted to bring the credit volatility which is marked at mid level to the exit level (bid/offer). It is calculated for bond options and credit default swaptions on a credit-by-credit basis. Credit Vega is netted across Credit America for each underlying credit regardless of option maturity. The bid-offer adjustment for each underlying credit is calculated by multiplying the net Vega and the weighted average volatility of that underlying credit and 1/2 of the bid-offer percentage. Bid-offer percentage is defined as the ratio of bid-offer volatility spread to mid volatility. The sum absolute of the bid-offer valuation adjustments for each underlying credit constitutes the total bid-offer valuation adjustment. The adjustment is allocated to each trading book by underlying credit according to the absolute risks of each book in that underlying credit.

Credit Vega Reserve = ∑ absolute (net Vega by underlying credit) * weighted average volatility* 100* bid-offer percentage* 0.5

The Bid-offer Vega valuation adjustment is calculated monthly by product control and reviewed monthly by the senior product controller.

We assume 10% bid-offer percentage for investment grade and non-investment grade issue and 15% for emerging market issue. If necessary, additional reserve might be imposed for long dated options with unobservable volatilities.

23.3. Bid-Offer Delta: Tranche Credit Spread Delta

Please refer to Global Fixed Income Valuation Adjustments for CDO for details

23.4. Bid-Offer Delta: Recovery Rate Delta

Please refer to Global Fixed Income Valuation Adjustments for CDO for details

23.5. Parameter Uncertainty: Recovery Rate Uncertainty

Please refer to Global Fixed Income Valuation Adjustments for CDO for details

23.6. Parameter Uncertainty: Historical Default Correlation

Default correlation between the assets in nth to default baskets are typically not directly observable in the market. The nth to default basket are valued using historical pair-wise equity-price correlation. A correlation reserve is therefore put in place to account for the uncertainty in this parameter.

Correlation Reserve = 50%*absolute (net beta05 by issuer) plus 50%*(absolute beta05 by issuer)

Beta05 is the sensitivity to a 5% shift in correlation. Both net beta05 and gross beta05 are included to take into account idiosyncratic and system correlation risk.

23.7. Liquidity Adjustment

A liquidity adjustment may be applied in certain instances when specific markets or products are considered not liquid or where a concentration of positions make the current bid/offer spread unobtainable. These markets are often characterized by larger bid/offer spreads, longer times to close-out positions and the limited ability to close-out positions. As a result, an additional liquidity adjustment may be deemed necessary. While the extent and amount of this valuation adjustment is subjective in nature, the general guideline is to apply the full bid/offer spread observed over a period of time to the position or exposure in question. Additional factors in determining the necessity of a liquidity adjustment include the firm's position relative to the market, the firm's position relative to the daily trading volume and the firm's recent experience in the reduction of large and illiquid positions. Liquidity adjustments are not allowed for level 1 product per FAS 157 and are applied on a case-by-case basis.

23.8. Deal Specific Adjustments

Product Control maintains valuation adjustments to reflect expected deal-related expenses that were not invoiced as of the close of a deal. These expenses are estimated and reserved against deal revenue at the time of the trade and released when invoices are received and processed or the risk is mitigated. Valuation adjustments for deal specific (contra-revenue) expenses are reviewed monthly with Senior Product Controller.

Product Control also maintains valuation adjustments to cover deal specific costs that are not properly reflected in the fair market value price. These may include, but are not limited to specific hedging issues and exotic optionality. Costs are estimated and reserved at the time of

trade, and are released when risk is mitigated. Valuation adjustments for deal specific costs are reviewed monthly with Senior Product Controller.

24. Real Estate

Bid-Offer Reserve: CMBX

Rationale CMBX positions are marked at consensus mid prices provided by Markit on a daily basis. FAS157 requires positions to be marked to an exit price (bid/offer)

Overview of calculation methodology Exposures are aggregated by index and series and bid-offer spread is calculated as below:

Bid-offer Reserve = Notional * PV01 * Bid-offer spread (in bps)

Bid-offer spread is applied as follows

Category	Bid-Offer Spread (in bps)
AAA	5
AJ	15
AA	20
A	20
BBB	50
BBB-	50
BB	50

Frequency of recalculation Monthly by Valuation Control

Product types All CMBX trades (excluding those directly used for hedging single name CDS)

Conditions for release Close-out of risk exposure

25. Munis

25.1. Bid/Offer Adjustment

Interest rate derivatives: Please refer to IRP products bid offer policy in general.

ABX/ABS: Please refer to Securitized Products bid offer policy.

MCDX: 1bps bid offer on net risk across maturity buckets.

25.2. Model Adjustments

Model adjustments are taken to address (1) limitations or biases in models and (2) the use of unapproved models (temporary adjustment until model is approved).

Currently there are the following types of model adjustments in the business:

Discounting Adjustment

Lehman adjusts the model to reflect the inability of the model to discount cash flows by a zero rate different than those reflective of the constructed forward curve. For example, for some trades, the forward curve is indicative of treasury yields. As a consequence, the model will discount using treasury like spot rates. As Lehman wishes to discount using LIBOR, an adjustment is made to reflect the reduced valuation by discounting by a LIBOR rate rather than a treasury rate.

CDS Model Adjustment

To adjust for model limitation in pricing Muni American credit default swaption. Day 1 P/L is held out. Currently only one trade in portfolio.

25.3. Credit Adjustments

Muni Issuers:

Credit adjustments represent the potential expected loss arising from counterparty default on obligations to the firm from financial instruments. The methodology should take into consideration the expected value of counterparty default. This should include both current exposure and a measure of the potential future exposure over the life of the transaction. The credit adjustment for the firm is generally based on an expected loss calculation that is calculated as follows:

Expected Loss = (expected replacement cost at time t minus value of collateral held) * the marginal default probability at time t * (1 – recovery rate), present valued and summed over t, for each counterparty. The expected replacement cost is the market value of a transaction given various market, legal and statistical parameters (i.e., volatility of underlying, correlation matrices, legal entity, netting status, unsecured amounts, minimum call amounts, confidence level, holding period and etc.)

All of the municipal derivatives Group's credit sensitive trades are pre-approved by the credit department prior to execution. The current level of credit adjustments were primarily calculated based on a matrix that uses time to maturity and credit rating to decide the level of adjustments. In addition, current adjustments also reflect a dynamic credit adjustment methodology for trades deemed to require credit mitigation in accordance with credit risk management's guidelines.

Monoline Insurers:

In addition, the desk has established separate credit reserve adjustments from derivatives exposures with some monocline insurers, as deemed necessary per Credit Risk Management. In particular as of Q2 2008:

XLCA: reserved at 52%

BluePoint Re: reserved at 75%

25.4 Funding Adj

Please refer to global funding adj policy.

26. Securitized Products

Generally, valuation adjustments represent credit reserves and upfront fees. From time to time, items under investigation or expected cash outflow/inflow (i.e., timing difference) are also held in valuation adjustments until the items are researched and resolved. The release of valuation adjustments is discussed with the appropriate deal manager.

26.1. Pricing Adjustments

Positions are reviewed on an ongoing basis using all available market information including regular reports from the asset managers and known events pertinent to the specific market in which the assets are held or the specific assets themselves. In circumstances where the recoverability of carrying value is considered doubtful, valuation adjustments are made to reduce the valuation to an estimated recoverable amount.

26.2. Credit

Provisions are held in the underlying mortgage subsidiary companies in respect of warehouse facilities where there is doubt as to the recoverability of the underlying debts. The age profile of the mortgage portfolio is reviewed to identify mortgages which have not been securitized on a timely basis. Mortgages in arrears are identified. Collateral values are reviewed in relation to the value of loans outstanding. Adjustments are made to the bad debts provision in the underlying mortgage subsidiaries as a result of these reviews.

26.3. Deal Specific

From time to time reserves are held against specific deal related exposures. The amount of each reserve is agreed by the product control manager with the business head.

26.4. Reinsurance

Valuation adjustments represent potential losses that may be incurred by future claims within the respective insurance policy.

Valuation Adjustments: Fixed Income (ASIA)

There are three parts to this Appendix.

Asia Specific Considerations: These are additions to the Global Policy on Valuation Adjustments. Note that these are not inconsistent with the global policy but add detail on implementation that is specific to Asia.

Reed Asia Policy: This is original Asia Valuation Policy ed in early 2007. It is included here as it provides more specific information and consideration on each of the reserve categories.

Deleted: draft

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Detailed policy per business area (last updated November 2006): this provides implementation details by area of the valuation adjustments taken in Asia FID and Equities. Note that this needs to be reed to be brought into line with the global categories.

Deleted: draft

27. Asia Specific Considerations

27.1. Credit Risk Reserve

Credit Risk Reserves are set aside as prudent measures to safeguard against potential Counterparty's Credit Risk. Valuation Control will work in conjunction with Credit Risk Management to determine quantum of Credit Risk Reserve deemed necessary against specific Counterparty Credit Risk Exposures.

27.2. Independent Price Verifications Reserve

Irreconcilable deviations of valuations derived from the Independent Price Verifications process against the Trader Marks indicate Valuation Uncertainties when Trader Marks are used for the daily Profit and Loss (P&L) reporting. The magnitudes of these deviations are to be set aside as Time-Out P&Ls in the Global Policy.

However in Tokyo, these may be also be set aside as Valuation Reserves in the Tokyo Office because of the following two reasons:

1. Tokyo Office is committed to release general Time-Out P&Ls within three working days.
2. Comparison of trader marks against market quotes will be the basis for the quantifications of the Barrier Shift Reserve.

The amount of Valuation Adjustment to be set aside is to be determined by senior Product Control management.

Deleted: draft

28. Reed Asia Policy

Type of Valuation Adjustments

The following are the main classes of Valuation Adjustments with respect to Fair Valuation:

28.1 Bid-Offer Spreads.

28.2 Special Bid-Offer Spreads.

28.3 Illiquid Missing/Stale Rates.

28.4 Model Uncertainties.

28.5 Parameter Uncertainties.

28.6 Independent Price Verifications.

The following is the main class of Valuation Adjustments with respect to Risk Exposure:

1. Credit Risk Reserve.

The above list is to be reviewed periodically by Valuation Control to check for the following:

1. Appropriateness of the quantifications of the Valuation Adjustments, including both the methodologies and amounts, in lieu of changing market conditions.
2. Completeness of coverage for Valuation Uncertainties, especially in lieu of new developments in the markets or the introduction of new products.

Valuation Adjustments Against Fair Valuation

28.1. Bid-Offer Spreads Reserve

Market has different price quotes for selling and buying of the same financial instrument. Normally, the price received from selling an instrument (Bid Price) is lower than the price offered to purchase the same instrument (Offer Price), since Market Makers retain a margin spread for their services.

In the event that positions are valued to the Mid-Market Prices (or Last Prices), Bid-Offer Spreads Reserve will be used to adjust for position valuations to the respective Bid or Offer levels. The choice to utilize reserves, instead of directly marking to Bid and Offer Prices, reflects system limitations and operational feasibilities.

Nevertheless, unwinding of positions may imply liquidating of all financial instruments or neutralizing the net risk exposures to each applicable risk factor. Given that Lehman Brothers adopted the latter for the basis of calculation to allow for hedged positions, Bid-Offer Spreads Reserves are to be computed on a net basis of the risk exposures for products that are marked to Mid-Market Prices (or Last Prices).

Bid-Offer Spreads Reserves are calculated by multiplying the net exposures to the risk factor and half the estimated Bid-Offer Spreads. The following principles are used in the computations:

1. Bid-Offer Spreads will be sourced from the data vendors systems (for example, Reuters and Bloomberg).

2. Bid-Offer Spreads will be interpolated and/or extrapolated from comparable data if they are not directly available.
3. Risk exposures should be bucketed by currency and tenor whenever obtainable and operationally feasible, as should Bid-Offer Spreads, in order to enhance accuracy.

28.2. Special Bid-Offer Spreads Reserve

A published price quotation in an active market is the best estimate of Fair Value. However, for financial products classified as Level 2 or Level 3 assets in the FAS 155/157's Fair Value hierarchy, the process of unwinding the position may incur price slippages when the positional size of the Bank exceeds transaction size of the price quotes used for Mark-to-Market and the markets are not sufficiently deep or liquid. The final realizable profitability of the transactions will be lower than the valuation derived from Market Prices.

The objective of the Special Bid-Offer Spreads Reserves is to estimate and adjust for the valuation changes due to price slippages when unwinding the positions in an orderly fashion in open markets. Deviations from the Bid-Offer prices in normal market conditions may come in two forms:

1. Widening of Bid-Offer spreads when unwinding the position in sizes larger than the transaction size for the market quotes.
2. Market movements during the unwinding process.

The unwind strategy should aim to balance the above two effects to minimize slippages during the unwinding process.

28.3. Illiquid Missing/Stale Rates Reserve

When the prices of products are available only periodically or irregularly, they may not represent the actual quotes that can be readily used in the liquidation process. In this situation, the actual Market Price of the product is likely to be different from the last available quoted price and this deviation increases with the length of time between the date when the quote was last available to the valuation date.

The objective of the Illiquid Missing/Stale Rates Reserve is to estimate and adjust for the valuation changes due to the infrequent observance of the quotes. The price deviations may come in two forms:

1. Infrequent observations of the market quotes.
2. As the underlying instruments are generally illiquid and not frequently traded, the market quotes are likely to be indicative quotes, rather than actual levels that can be readily executed in the markets.

28.4. Model Uncertainties Reserve

In general, there are no direct price quotes for complex derivative structures and models are used for valuations. However, the use of different models using different underlying methodologies and assumptions produce different valuations for the same product under the same market conditions. In such a situation, there are no methodologies to determine Fair Value in any precise sense.

The objective of the Model Uncertainties Reserve is to estimate and adjust for the valuation changes due to the different valuations produced from different models. The pricing uncertainties may come in the following forms:

1. Equally Applicable Models – In the case of new exotic derivatives that are recently launched, there are no industrial standardized models. It may be possible to value the same product using several models, each of which is equally appropriate.
2. Slow Convergence of Iterative Techniques – In the case of a model using slow convergence iterative techniques, different starting values and different number of iterations may converge to different valuations. Although the final correct valuations can be reached with greater number of iterations, it may not be operationally feasible because of time constraints.
3. Randomness due to Monte-Carlo Simulations – In the case of a model using Monte-Carlo simulations in its pricing engine, different number of simulations may converge to different valuations. Although the more correct valuations can be reached with greater number of iterations, it may not be operationally feasible because of time constraints.
4. Approximations due to Numerical Techniques – In the case of a model using Numerical Techniques (for example, Numerical Differentiation/Integration, Finite-Differences, etc) in its pricing engine, the final valuations are numerical approximations of the actual valuations. These approximations may be crude if different granularities produced significantly different valuation results. Numerical precisions and time constraints may limit the ability to produce more accurate valuations.
5. Inadequate Models – In the case of a model that simplifies the Market Parameters input, the final valuations are approximations to the actual valuations. A common example is an option pricing engine that only allows the input of one Implied Volatility Level Market Parameter and will not be able to capture the term structure of the Implied Volatility Surface, including the skews and the smiles. In general, it is not possible to simplify the entire Volatility Surface into one Implied Volatility Level while preserving all the information.
6. Breakdown Of Pricing Mechanism For Extreme Market Data Levels – Models that produces the proper valuations when the Market Data are within the normal range may not work well outside the normal range. Some of the issues are implicit within the model assumptions. A common example is the case of using a pricing model that assumes lognormal distributions to price a long-dated structure, in which case, a moderate level of 25% annualized implied volatility over a 20-year period produced a lognormal distribution with 112% volatility.
7. Inappropriate Models – In the event that some business units need to deal with exotic derivatives that are not part of their core businesses, the exotic

derivatives may not be valued using the appropriate models. Examples include the use of Cash Flow models to analyze collateralized tranches of mortgage-backed securities resulting from the Structured Finance Desk's securitization business and use of Interest Rate term-structure models to price commodity structures.

8. No Models – In the event that some business units need to deal with exotic derivatives that are not part of their core businesses, the exotic derivatives may not be valued at all and the Business is prepared to take zero valuations on the exotic derivatives. A recent example occurs when the High Yield Loan Business lend money to a start-up company whose payback to the bank includes exotic equity warrants linked to the credit facility.

28.5. Parameter Uncertainty Reserve

Even in the situation when there is a standard industrial model for the pricing of certain complex derivative structures, there may be uncertainties regarding the levels of the required Market Parameters that are needed to value the derivative structures, hence introducing uncertainties in the valuations. Uncertainties regarding the levels of the required Market Parameters may come in the following different forms:

1. Interpolation/Extrapolation of Market Parameters – The market quotes for certain Market Parameters are only available at certain benchmark values and the actual Market Parameters used for pricing are obtained from interpolation/extrapolation of these Benchmark Parameters, resulting in Valuation Uncertainties. Such examples include the pricing of options (both strikes and expirations) and odd-tenor swaps. In general, the magnitudes of Valuation Uncertainties arising from Interpolation are generally not significant and Valuation Adjustments may not be needed. However, a proper approved methodology need to be used in the case of Extrapolation, together with a methodology for the computation of Valuation Adjustments.
2. Smiles/Skews Of Implied Volatility Surfaces – The market quotes for these curves are usually for the ATMF plain vanilla options and, at times, the 25% risk-reversal and butterfly implied volatility market quotes (sometimes even the 10%) are available. However, this may not be easily available in less liquid markets and will need to be estimated.
3. Unobservable Market Parameters – The valuations of customized/exotic transactions may involve parameters that are not readily observable from the markets. Examples include correlations of customized credit derivatives, recovery rates in the pricing of digital CDS, prepayment rates for mortgage-backed securities. The methodologies to derive the Market Parameters have to be independently reviewed and approved, together with the methodologies for computation of Valuation Adjustments.
4. Calibrations of Equilibrium Models – There are two types of interest rate models, namely, the equilibrium models and the no-arbitrage models. No-

arbitrage models use the market data directly as the model parameters. However, equilibrium models usually start with assumptions about economic variables, derive a process for the short-term risk-free rate and construct the entire term structure on interest rates at any given point in time. Hence, there are usually some deviations between term structure of interest rate from the Equilibrium Models and the actual observable market data.

5. Transformation of Market Parameters – The pricing of multi-factor derivative structures may involve transformation of market parameters. As an example, information within the entire correlation matrix is condensed into a single correlation level for the pricing of CDOs (the single-factor, single-correlation model is the industrial standard model for pricing of these derivative products). Another example is to condense information from the entire volatility surface into a single implied volatility level in the pricing of path-dependent options. The original information (including both valuation and risk exposures quantification) are generally not retained during the transformation.
6. Term-Structure Consistency – Volatile market conditions sometimes produce inconsistent term-structures that can be arbitraged. These had happened in both the interest rate markets and implied volatility surfaces during the Asian Currency Crisis. Other examples include the negative HKD/CNY interest rates implied from the currency forwards in expectation of the breakage of currency pegs (with corresponding negative forward volatilities in the interest rate markets) and the breakdown in base correlation structure for the CDO tranches during the credit squeeze. Even during calm market periods, the implied volatility surfaces sometimes produce inconsistent forward implied volatility skews. Valuation Adjustments (quantifying between the current market conditions to the nearest consistent market levels) need to be set aside during such periods.

Detailed Implementation by Area

Valuation Adjustment Policy

29. High Grade Credit

FID Product Control will maintain valuation adjustments to fair market value based on expected costs associated with maintaining or closing derivative risk positions.

Valuation adjustment assumptions and methodology are subject to adjustment based upon changes in the market and product structure. Any assumption or methodology changes are required to be approved by both the business head and the senior product controller.

29.1. Bid / Offer

Please refer to Valuation Adjustment: Fixed Income (Americas)

Sub topic: Bid-Offer Delta: Credit Spread Delta

29.2. Deal Specific

Deal Specific Contra-Revenue Expenses

Product Control maintains valuation adjustments to cover expected deal-related expenses that were not invoiced as of the close of the deal. These expenses are estimated and reserved against deal revenue until invoices are received and processed. Valuation adjustments for deal specific contra-revenue expenses are reviewed monthly with Senior Product Controller.

Deal Specific Costs

Product Control maintains valuation adjustments to cover deal specific costs that are not properly reflected in the fair market value price. These may include, but are not limited to:

- Specific hedging issues
- Concentration
- Exotic optionality

Costs are estimated and reserved at the time of trade, and are released when risk is mitigated. Valuation adjustments for deal specific costs are reviewed monthly with Senior Product Controller.

29.3. EITF

This reserve is no longer taken since the adoption of FAS157.

30. Interest Rate Derivatives

The Firm policy of valuation adjustments for derivative transactions is based on the framework that derivative portfolios should be valued on a mid-market levels less specific adjustments or on appropriate bid / offer levels. Mid-market valuation adjustments should allow for expected future costs such as close-out costs, funding, hedging, and unearned out credit spreads. The valuation adjustments for bid/offer, liquidity, and model are based on the risk in IRIS. IRIS is used to consolidate the risk parameters for the Interest Rate Desk, it is the source that Product Control uses to compare risk with the Desk on a daily basis as well as the source Lehman Risk uses for VaR. The Core Interest Rate Derivative portfolio applies the following valuation adjustments to its portfolio:

30.1. Bid / Offer

Product control maintains market-based valuation adjustments for both Volatility and Swap spreads to convert from a mid-market valuation to a bid/offer basis where a particular business may be required to close out positions or mitigate risk. This market reserve is maintained to quantify the expected cost of liquidating a position.

The Bid/Offer spread will be sourced from various brokers including but not limited to the following:

- Telerate
- Euro Brokers
- Prebon Yamane
- Tullett and Tokyo
- ICAP

Spreads will be reviewed periodically on a quarterly basis.

Swap Bid/Offer

We calculate ½ the difference between the bid/ask as quoted by brokers and apply that to the absolute value exposure obtained from IRIS for each particular tenor.

Swaptions Bid/Offer

Volatility risk is calculated by splitting vega into 3 buckets based on the correlation of the exposure in that bucket. The volatilities in each bucket are highly correlated and can be used to mitigate the overall risk within that bucket. The net value of risk in each bucket is then multiplied by an appropriate mid to bid/offer spread (i.e. representative of where we have exposure) to arrive at a reserve figure. The total reserve is then the sum of the absolute reserves for each bucket.

30.2. FX Liquidity

Product control maintains a liquidity reserve when the Desk has exposure in less liquid markets. Currently, we are calculating an additional 0.75 vega on long dated volatility exposure greater than 10 years. This requirement is based on discussions with the Desk and external brokers. As in the bid/offer reserve, we calculate ½ of the 0.75 Bid/Offer vega and apply to absolute value exposure from IRIS.

30.3. Model

Model adjustments are taken when we need to model-to-market the Desk's exposure. This model-to-market may be due to the uncertainty in the existing model to provide a price that can be executed in the market. Product control maintains a 0.25 vega Bid/Offer adjustment on HJM exposures, as HJM uses a path dependant model to value American and Bermudan options. The 0.25 vega used to calculate the model adjustment is based on conversations with Derivatives technology, research, and product control. This level of adjustments is reviewed periodically.

In addition a correlation adjustment is taken of 1 standard deviation is taken, based on a 12 month rolling, calculation over the previous 5 years.

30.4. Credit

On a case by case basis, where it is assessed that significant credit exposures are held, typically resulting from uncollateralized mark to market amounts, consideration should be given to raising credit provisions. Credit adjustments represent the potential expected loss arising from counterparty default on obligations to the Firm from financial instruments. The adjustment methodology takes into consideration the expected value of counterparty default.

30.5. Early Termination

In the case of certain structured transactions an amount of initial P&L is reserved to provide against the cost of an early termination by the client, where the client would not be expected to suffer the full cost of the structuring expertise priced into the transaction.

The amount deferred is agreed by the product control manager with the desk at inception of the trade and is specific to each transaction.

Early Termination adjustments are reviewed with the desk each month end and a decision taken as to how much should be released to P&L, recognizing that the risk of losing the initial spread diminishes over time and as the underlying moves.

31. High Yield

31.1. Equity Discount Policy

Scope

All listed restricted and unrestricted equity positions with a market value > 1mm which were acquired either through a debt restructuring process or via an "inactive" market.

Equity positions obtained directly through an "active" market will be subject to a liquidity reserve (as defined below) only in the case where a block is acquired.

Listed equity positions not meeting the above criteria will be marked to unadjusted exchange prices on a daily basis.

Unrestricted Equity

Policy

Unrestricted equity positions meeting the scope above will be subject to a liquidity discount as follows:

Liquidity Discount: Consistent with the Global Equity Reserve Policy, a Value-at-Risk (VAR) based discount is applied to the exchange price. The inputs, per the policy, are:

- Share price: closing exchange price
- Share position: number of shares owned
- Average daily trading volume (ADTV): as calculated by Bloomberg for the last 3 months of trading
- Volatility: 30-day historical volatility, as calculated by Bloomberg
- Calculation:
    - (1) Sell-off days: Share position / (ADTV / 10). Note: 10% ADTV assumption is used based on trading experience in Asia
    - (2) Standard deviation: (Volatility / SQRT (252/Sell-off days)) = 1 standard deviation (84% C.I.)
    - (3) VAR: Share Price * Shares * Standard deviation
    - (4) Discount: VAR * 0.5, which assumes a linear sell-off over the holding period.

The liquidity discount will be subject to a maximum of 55%.

Restricted Equity

Policy

Fair value of restricted equity positions should be based on the price of the otherwise identical unrestricted security, adjusted for the effect of the restriction. When applying the restricted discount, Product Control will consider all currently available 3rd party information in order to determine the maturity bucketing outlined below.

Restriction Discount: Discount for the effect of the restriction considering the duration of the restriction, volatility of the share price, and qualitative factors unique to the security. Consistent with the Global Private Equity reserve policy, discounts for given holding periods are:

Time Period	Discount
Up to six months	0 - 15%
Six months to two years	15 - 35%
Greater than two years	35 - 55%

Amortization of Restriction Discount: As time passes, the discount will be amortized such that it stays within the above time period ranges given the remaining duration of the restriction. P&L resulting from the amortization will be recognized in the fiscal quarter in which the time period cross-over occurs.

- Example: Due to the passage of time, a position with a 45% discount falls below 2 years in November; result --- 10% of the discount will be amortized in the 4th quarter, with a 35% discount remaining at quarter-end.

Exceptions

For equity positions with inactive markets which display extreme volatility (thereby questioning the credibility of the market price) and/or excessive unwind periods (concentrated positions in inactive markets), additional discounts will be considered. For these exceptions, the business and product control will agree upon an appropriate discount and document accordingly.

31.2. Bid / Offer

Please refer to Valuation Adjustment: Fixed Income (Americas)

Sub topic: Bid-Offer Delta: Credit Spread Delta

31.3. Deal Specific

Deal Specific Contra-Revenue Expenses

Product Control maintains valuation adjustments to cover expected deal-related expenses that were not invoiced as of the close of the deal. These expenses are estimated and reserved against deal revenue until invoices are received and processed. Valuation adjustments for deal specific contra-revenue expenses are reviewed monthly with Senior Product Controller.

Deal Specific Costs

Product Control maintains valuation adjustments to cover deal specific costs that are not properly reflected in the fair market value price. These may include, but are not limited to:

- Specific hedging issues
- Concentration
- Exotic optionality

Costs are estimated and reserved at the time of trade, and are released when risk is mitigated. Valuation adjustments for deal specific costs are reviewed monthly with Senior Product Controller.