



Comptroller of the Currency
Administrator of National Banks

Washington, DC 20219

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From: Michael Sullivan, RAD and Ron Frake, NBE
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Subject: Subprime CDO Valuation and Oversight Review - Conclusion Memorandum

Section I – Scope

Our special review of the bank's subprime CDO exposure focused on the risk positions outlined in the bank's November 4, 2007 Press Release and 8K disclosure. This disclosure projected large writedowns that were subsequently realized in month end valuations for October and November. The risk positions are primarily super senior positions in CDO's and Liquidity Puts written for off balance sheet investment vehicles. The exposure underlying many of these investments is subprime mortgages. Fieldwork was conducted in late November and early December, 2007.

The major objectives of this review were as follows:

- Understand the bank risk positions highlighted in the Citigroup press release.
- Determine how all the bank positions arose and over what period of time.
- Evaluate the valuation methods used to arrive at the range of losses announced.
- Determine weaknesses in management practices associated with these events.
- Check the rationale behind the business booking of these risks within the bank, or other corporate vehicle.
- Ensure that non-bank obligations did not ultimately become bank positions. If that did occur, explore the reasons.
- Assess whether the valuations are reasonable in light of the risks and the depth of the bank's analysis of same.
- Determine if there is a high risk of additional charges that may need to be taken.

Section II - Evaluation and Recommendations

A - Valuation

While the current valuation method is broadly within the range of current market practice, collateral-based valuation results should be factored into this analysis.

The bank uses a discounted cash flow approach, which forecasts cash flows at the ABS level by pool level characteristics, builds up tranching cash flows by applying waterfalls, and discounts at a risk-adjusted rate. The cash flow forecasts use a simple approach that accounts for expected home price appreciation at a macro level; waterfall calculations are very involved and improving in precision. Given the simplicity of the model compared to actual cash flow dynamics, the discount rate (spread) becomes a key choice. The bank now uses judgmental ratings as a way to incorporate possible downgrades, and has moved closer to ABS market spreads over time, though it still relies on CLO spreads as a proxy. This choice is difficult to justify given the differences in the underlying collateral of ABS CDOs and CLOs; however, ABS CDO spreads are not observable while there are occasional CLO transactions. There is large degree of judgment involved and spreads are assigned by broad product type rather than being set to the particular characteristics of each deal.

An alternative method that starts by valuing collateral and then building up to CDO value, using a correlation model for some positions, has proponents within the bank and would have lead to larger writedowns. It is more of a market-based approach and better aligned with how you would hedge the risk. It also has substantial judgment involved because the actual market for the instruments is not trading but it is consistent with current marking procedures for the collateral.

- Collateral-based valuation results should be part of regular reporting and factored into the assessment of final value. We understand they are being run daily. This includes use of the correlation model, an important analytical tool even if its results are not used for official valuation.

Control groups need to be more engaged and fully execute their responsibilities.

- Product Control does not have sufficient staff or quantitative resources to evaluate the various components of the valuation model. They are set up for checking marks directly against market observables and have not fully adapted to the new situation in which direct market quotes don't exist. Typical procedures like checking sensitivity of marks to unobservable parameters have not been developed.
- Independent model review was cursory and descriptive, not detailed and insightful. The Model Validation Group (MVG) documented the model for the business rather than having the model developers provide detailed documentation. The model reviewer seemed unfamiliar with the details of the model and did not assess potential impact of model limitations. Even for a Level 1 validation the work was inadequate. The model is nominally high priority for L2 validation but actually no work is being done at this time.
- Not only are the control groups disjointed from the business, but they don't seem to be engaged with each other. Business level Product Control did not get a waiver from business level Risk Management to use an unvalidated model for end-Sep reports and did not have typical month-end discussion of results. MVG is out of the loop.

The DCF model controls and transparency require improvement.

It is understandable that events during the year produced tremendous pressure on the business to deploy a new valuation model on short notice outside the typical development and validation process. But several months after the first use of the DCF model there are several deficiencies that need to be addressed. While control groups could be criticized for their lack of engagement, the business is responsible for ensuring compliance with corporate policies.

- The DCF model is not in a controlled environment. This introduces substantial operational risk, and invalidates the MVG validation.
- Developer documentation is sketchy, and testing results and analyses are limited. Model developers are unfamiliar with policies and procedures, particularly in regards to documentation (and control environment as mentioned above). Ongoing changes are not being documented or being communicated to MVG and risk management.
- There is a lot of work to do and independent risk management and MVG have resources, but at this point the business seems determined to work it out on its own. Accommodating the business played a role in setting up the current situation; a shift in strategy that makes control groups real partners will be important.

B – Business Oversight Controls

There were many contributing factors to the write-downs, including the fact that Citi was a major participant in the CDO market, and that management believed that the risks underlying super senior positions were acceptable in light of the subordination in these deals and the agency ratings. An important reason is also a fundamental strong push for generating income. The apparent need to generate quarterly income triggered a ramping up in risk exposure. The original business model of originating to distribute structured products was modified to allow for holding on to significant parts of a deal. The super senior exposures were retained, in part due to the cost to either selling the exposure at inception or buying hedges to those exposures. The following corporate practices need to be revised.

The Board and senior management need to ensure that Independent Risk Management has complete authority and/or executes its authority to restrain the business when appropriate.

Business units possessed too much power, and independent risk management was marginalized. Senior management did not ensure that independent control groups, risk management and product control, had the requisite staff, analytics and expertise to understand and monitor the business. This left them ill-equipped to provide an objective and critical evaluation of risk and put them in a weak position to manage rapid expansion of the businesses. Additionally, risk management had insufficient authority and/or failed to exercise its authority to restrain the business when necessary. While the desk level market risk management staff seemed to appropriately escalate issues up the management chain, decisions on risk were deferred to senior business unit management's wishes. For example, when the ABS Correlation desk asked independent risk management for new limits to support their shift in business strategy, risk "stood down" when senior business management was in support of the increase.

Efforts are necessary to reduce significant inconsistencies across business units.

The US Cash CDO desk and ABS correlation desk had different limit structures than the Mortgage business, where concentrations by collateral type were identified. The ABS correlation desk moved away from bespoke single tranche CDOs and into the structuring business with an inadequate infrastructure that did not feed risk into corporate systems. In

contrast, the US Cash CDO desk had an established infrastructure. There were no SS limits for the ABS correlation desk while there were for the US Cash CDO business. Limiting super senior exposure in synthetic form should have been done similarly to limits in cash instruments. Different valuation approaches were used for the structuring and single tranche exposures. Control groups accommodated the businesses and worked around the issues, but even if they had spoken up it seems they did not have the standing or support to improve consistency. Business units were individually responsible but their focus was on revenues. These inconsistencies give rise to the question of whether management was fully informed of all subprime exposures or fully understood the ramifications.

Finally, through discussion we became aware that the mortgage trading desk prudently managed associated risks, and possessed the depth of personnel and experience in mortgage products to escape significant losses. Yet at the same time, other desks got significantly involved with structuring, distributing, and retaining subprime mortgage exposures without the expertise needed to avoid massive losses to the institution.

Risk limits need to be consistently applied and risk aggregation needs improvement.

In concert with the criticism above, there was inconsistency in limits applications and a lack of clearly aggregated exposures by underlying collateral type. Further, management has identified the need for a consistent view of risk across the company as one of its lessons learned.

Product expansion and evolution across trading desks needs to be better controlled.

We observed businesses where structured products had been created and distributed for many years (the Cash CDO product based upon ABS). While the creation of a product and the underlying risks in one business may be clearly understood and actively and prudently managed, the same product in the hands of a different management team was not managed properly. The risk management process to ensure adequate expertise, depth, and infrastructure was not sufficient to protect the bank from significant risk exposure, especially as risks across desks became a significant risk exposure and concentration. Further, the move to actively utilize subprime collateral should have been reviewed and evaluated by CMAC and probably the CMB's Business Risk Practices Committee.

Section III – Supporting Comments

Risk positions

Through the summer of 2007 and into September, the bank had dramatically written down subordinate CDO tranches but continued to value Super Senior (SS) positions largely at or near par. In October, rating agencies began widespread downgrades of RMBS bonds and related CDO structures, the ABX index dropped significantly, and Merrill Lynch wrote down their SS positions. This led the Bank to re-evaluate spreads used to value SS positions and the method of determining marks. At the time of the 8K there was \$43B in SS notional. Of the subprime collateral, recent vintages (2006 and 2007) are riskier due to lax underwriting standards and high potential for fraud:

- ABCP: \$24.9B notional of Asset Backed Commercial Paper (ABCP) associated with 17 Liquidity Put (LP) facilities. Subprime ABS exposure in these positions was generally

around 70%, with a typical split of 40% in ABS bonds and 30% in ABS CDOs. Around 15% of the collateral was the riskiest 06/07 vintages through either bonds or CDOs holdings, with some variation across deals in amount of ABS and 06/07. The bank marked these positions to an average 91 cents on the dollar at the end of October.

- **SS-High Grade:** \$9.6B of SS CDOs with high grade bonds/CDOs underlying the structure. These were left over from structuring deals and had not been hedged. Overall ABS exposure was a bit higher than in LPs, it reached 96% in one deal, and there is concentration in 06/07 vintages, typically around 70%. End October mark: 76 cents on the dollar.
- **SS-Mezzanine:** \$8.3B of SS CDOs with mezzanine underlying in deals that were virtually all ABS collateral (90-100%), a high proportion in 06/07 ABS bonds, but significant collateral of earlier vintages in some deals. End October mark: 63 cents on the dollar.
- **SS-CDO2:** \$0.2B SS CDOs with CDO2 underlying, 0.7B notional long offset by hedges of 0.5B. The CDO2 are predominantly CDO collateral, 70%, and around 40% 06/07 vintages.

Not included in the 8K were SS CDOs that were hedged or had been sold off.

- **SS-closed:** \$7.4B, some are hedged by insurance, the rest were sold off to third parties.

Chronology of positions

The bank built up SS positions because they are hard to sell in the primary issuance market at the nominal spreads available for SS once deals were completed (10-20bp) and the bank was reluctant to give up some of the inception profits. There is virtually no secondary market. Trading management could also have hedged through insurance, but the monolines have limited capacity, hedging would have also reduced initial deal profit, and it could have slowed down deal flow. There was a strong mandate from senior management to grow these businesses and earn fee income.

Liquidity puts were used from 2003 into 2006. But these ran up against a \$25B limit imposed by Treasury based on contingency funding requirements. Once use of LPs was curtailed by hitting that limit, a bit more than half of SS exposure was retained in a situation where volumes were strongly increasing just in time to get caught by the market disruption. The following shows when positions were acquired:

<i>Product</i>	<i>Amount</i>	<i>Acquisition dates</i>
ABCP	\$24.9B	LPs done 2003-early 2006; ABCP purchased Aug-Oct 2007.
SS-HG	\$ 9.6B	\$6.3B between Mar-Aug 2007; remainder primarily in late 2006.
SS-Mezz	\$ 8.3B	\$2.0B in 2007; \$6.3B in 2006.
SS-CDO2	\$.2B	Long position of \$.7B consists of 1 deal in 2006 and 1 deal in 2007; Short position of \$.5B from hedge placed in 2007

Additional detail

Two business units were at work structuring deals. The US Cash CDO desk in New York had been around since 1997. It had a developed infrastructure and distribution channel for ABS CDO, CRE CDO, and CLO. The ABS Correlation desk in London specialized in ABS CDOs,

beginning with bespoke single tranche CDOs. It started as a trading desk, but in the last half of 2006, it evolved into doing full capital structure deals like the US Cash CDO desk.

The US Cash CDO desk was more of a capital markets operation than trading. They worked with clients/deal managers to set up a CDO deal, purchase collateral, and to ensure the assets met the deal terms. They were basically a cash business, but increasingly used synthetics to structure deals. The CDO managers took the equity piece of the deal and the bank sold the mezzanine tranches through its distribution channels. The desk increasingly got into subprime mortgages because that is what clients desired. Clients were designing deals with more subprime ABS to benefit from the higher coupon rates that put more yield into the deals. Given that US interest rates had been low for a number of years, investors were aggressively seeking increased yields at what they perceived to be little additional risk.

From 2003 through 2006 the US Cash CDO desk issued liquidity puts to Special Purpose Vehicles (SPV) that bought a variety of long term assets, including subprime CDO, and financed the bulk of the holdings by issuing CP. The LP was needed to get a high rating on the CP. The bank's treasury unit set a limit of \$23B on LPs, reviewing each deal as well. This facility ran out in 2006, a final deal was allowed as an exception to bring the total up to \$25B. After that, the CDO desk had to either sell, hedge, or hold SS. They achieved a rough split: \$9B was open (unhedged) and another \$7.4B was closed (sold/hedged).

The ABS correlation desk strategy started out as arranging bespoke (customized) single tranches. They mainly dealt in synthetic transactions. If a client wanted mezzanine exposure, the bank would provide the position to the client and then dynamically hedge the exposure over time. There was much less of a ramping period since the effort was just to get the hedges in place for the specific tranche rather than acquire all of the reference assets and deal with the pieces the primary client didn't want. Tight spreads in the market through the summer of 2006, combined with the desk head's preference for structuring rather than risk management, led the desk into full capital structure deals. The change in strategy took place in the fall of 2006 and the desk quickly built up volumes, doing its first trade in Nov 2006 at a tidy profit that supposedly validated the business model. To accommodate this change in strategy, risk management allowed recurring exceptions to limits. Limit exceptions were elevated to senior management in the business who allowed the desk to change their trading strategy. Permanent changes to the limit structure were subsequently made.

By late 2006, performance of 06 vintages were being reported as markedly worse than earlier vintages, a warning signal that led some market participants to re-evaluate their strategies and pull back from the ABS markets. Markets became choppy and spreads widened. The US Cash CDO and ABS Correlation desks did not pause, and saw this as an incentive to do more deals given the wider spreads. This continued a trend: CDO issuance in 2006 was double the amount in 2005, and 2007 was planned to continue the increase. This was a business where Citi was consistently at the top of the league tables, except for last year when Merrill Lynch took the title.

In Feb 2007, spreads widened dramatically and the markets seized up. Trading volumes and the ability to sell positions dropped, index hedges (via ABX) performed poorly as there was no one willing to take the other side of trades. The ABS correlation desk lost \$50 million on its positions at the time. The market seemed to recover over the next few months, trading at higher

spreads but still trading. Both desks had substantial deals in the pipeline and actively continued ramping them up.

It wasn't long before the ABS markets seized up again and so far there has not been any recovery. The US Cash CDO desk determined that the best they could do was to finish off deals, move the equity and take on the mezzanine and SS. The desks were caught with collateral in the pipeline, mezzanine pieces of recent deals, and the overhang of SS. By Nov 2007 only the SS had any substantial value.

Commentary

Neither the rating agencies, nor the bank took into account the concentrated aspect of the product with its heavy emphasis on subprime mortgages. They did not consider that this new product may not have the same characteristics as a more traditional mortgage product.

The bank placed undue reliance on rating agencies for evidence of the low risk of SS since the SS was above the AAA rated tranches in the deals.

One could argue that the bank should have increased the yield on the transaction (and reduced their fee) in order to sell off the SS, reducing the trader's profit. Management intends to address this type of situation by adding a liquidity component to their economic capital charge to discourage traders from holding illiquid positions.

Current valuation method

For 3Q07 reporting (end Sep) the bank decided to use a Discounted Cash Flow (DCF, aka Intrinsic Cash Flow model) to value all of its subprime ABS CDOs and has continued with that through end-Nov with some modifications/enhancements. There are 3 steps

- **Forecast loan pool cash flows:** In early 2007, the Mortgage Strategy group developed a CF forecasting model for subprime that it used for relative value trading and that approach was promoted to official valuation status in Sep 2007 and used on the over 9,000 CUSIPs that were referenced or held by the Cash CDO and ABS Correlation desks. Mortgage Strategy first models the amount and timing of expected CFs by broad loan type due to prepayment and default, using historical data on prepay and default from 1996-2006, the bank Chief Economist's forecast of Home Price Appreciation (HPA) at the national level, and adjusting for recent delinquency data. Then, for ABS bonds where it has information on loan pool characteristics, it produces composite pool-level CF vectors.
- **Apply bond and CDO waterfalls:** The CDO desk quants run the pool forecast CFs through ABS bond and CDO security terms (waterfalls) that determine the timing and amount of expected CFs for the various ABS bonds and CDO tranches.
- **Discount at appropriate risk-adjusted rate:** Once expected CFs are estimated, you need a discount margin (spread over coupon/contract rate) to get present value. First, the CDO desk subjectively re-rates positions, trying to anticipate what rating agency downgrades would be. Then, a matrix of CLO spreads by rating level is used to assign discount margins by deal type.

Assessing the valuation model

This seems broadly consistent with current market practice and what other banks are doing. The model has many simplifying assumptions and shortcuts. It gives a first order approximation to value, missing a myriad of details about factors that determine CFs and deal types. Over time, the bank has improved the precision of its waterfall estimates and moved spreads closer to market observables (from corporate bond spreads in September to CLO spreads in October).

While the CF forecast is based on a quantitative model and could attract attention for its simplifying assumptions, the choice of spread is key and can override the impact of CF forecasts. The bank resists using the only open market for subprime related deals, the ABX index. Management stated that the ABX underlyings are quite different from bank positions and they only reflect recent vintages. The CLO market has occasional transactions and the argument is that it contains a "structured finance" premium. In any case, there are a range of CLO spreads and one spread is chosen for each deal type (LP, SS HG, SS mezz, and SS CDO2) so even for the spread there is a lot of latitude to choose a spread deemed appropriate.

The connection to external markets is loose and a spread can be selected to back into a target price. This is sensible given the shortcomings of the CF forecasts and the DCF approach overall, you are not mechanically tied to model outputs. It is also practical, given that there are no direct market observables and limited market information on prices of related exposures. But it means that judgment plays a large role in final numbers. For positions of this size it should be seen as an interim approach and significant effort is needed to move to a more objective valuation method.

The alternative collateral-based approach (see below for details) more directly ties into the subprime ABS market and better reflects the details and distinctions of the positions. It also has substantial judgment involved because the actual market for the collateral is not trading but aligns with current marking procedures for the collateral.

Evaluation of the model control process

Model control processes did not work. The model was built in a short time and largely circumvented typical control policies and procedures. Developers were not aware of their responsibilities under corporate policies, having typically built trader tools rather than official valuation models. Control groups did not enforce them at the time and are now firmly on the sidelines.

- The model has substantial operational risk involving manual processes of moving data and intermediate calculation results between multiple huge spreadsheets.
- Data flows and processing are complex and the model needs highly skilled analysts (CDO desk quants) to run. Product Control can only spot check results.
- Only an overview of its processing components and corresponding assumptions is available. There are few details of the specifics of its calculations, estimation procedures, proxying, etc.
- Documented testing to demonstrate performance and identify potential impact of model limitations is limited.
- The model was unvalidated at the time of first use and did not receive an explicit waiver from market risk management. Product control did not consult business level risk management when the model was first adopted. Of course, senior management of the

business, risk management, and product control were involved in the decision to use it, so there was at least tacit approval.

- The model received a cursory Level 1 validation after the fact. The model reviewer documented the model formally for the developer, compiling whatever was at hand at the time, but seemed unfamiliar with the actual details of implementation.
- Changes have been made in the model components to improve its precision but these are not being documented and provided to the Model Validation Group to determine whether they require additional independent review. The L1 validation report did not highlight the imprecision in the end-Oct application of the model except in summary fashion.
- The lack of a control environment for the model invalidates the Level 1 validation.

There is close attention being paid to final numbers. However, there is substantial operational and model risk with the current approach and no indication that corporate policies and procedures intended to mitigate that risk are being applied. A robust model control process would put the bank in a better position to develop and enhance the valuation model.

An alternative valuation approach based on the underlying collateral

The 8K disclosed a range of possible writedowns between \$8B and \$11B. The \$8B was based on the DCF model described above. The higher potential loss was based on analysis of collateral. While markets are not active in the underlying subprime collateral there is market information from external pricing services such as MarkIt Partners (MIP) that collect indicative prices from dealers and report averages and the range. Also there are internal bank trading desks that deal in the underlying collateral and can provide quotes. Since this is not the official valuation model we did not get detailed documentation of the method but did get a written summary.

The basic assumption of the collateral-based method is that only the SS tranche has any value and it is equal to the sum of the values of underlying collateral, including the subprime ABS bonds and CDOs. This could overstate the value of SS because subordinate tranches may still have value. On the other hand, in the current depressed and illiquid market the sum of collateral values is much smaller than the SS principal indicating that indeed the value of subordinate tranches is currently nil. US Cash CDO and ABS Correlation desk positions are run through the ABS correlation model. The inputs to the model are prices/spreads on reference assets (bonds, CDS on ABS/CDO, CDOs) and an assumed correlation parameter. Through a simulation approach that takes into account correlated defaults (Gaussian copula) expected value is obtained and discounted using risk free rates to a current value. At the current low values for collateral, the result is insensitive to correlation and the effect is basically the sum of collateral values. LPs are not set up to be run through the correlation model and a simple sum of collateral values gives an estimate of the value of the associated ABCP.

Details on the collateral valuation are contained in a write-up from the Pricing Analytics Reporting Group, a unit that serves as an internal consultant for Product Control on quantitative issues. For derivatives (CDS on ABS/CDO) values come from internal marks by either the Mortgage Trading desk or CDO desk. For cash bonds, if available in MIP then lower of MIP value and ABX indicated price; otherwise grid-based prices with pretty severe writedowns for CDO bonds, and with RMBS/CMBS bonds tied to relevant indexes (ABX, CMBX). The theme is to use market information where possible along with traders' insight, reflecting the depressed

levels of indices and making a rough distinction between positions by vintage and original rating. This method does not require subjective re-rating because the index prices are reported based on original rating of collateral and so reflect the impact of downgrades.

There was a vigorous debate among senior management on the merits of DCF vs. collateral-based valuation. Generally, traders, including London desk management, and NY business level risk management preferred collateral-based valuation. Several presentations were made outlining the choices and the pros/cons. The final decision was made for end-Sep valuations in favor of DCF and that has stayed in place. As indicated in the 8K disclosure, collateral-based analysis produces lower values and larger losses; it is tied more closely to market information about subprime markets. While markets are not yet trading, the collateral method is more closely aligned with possible hedges of positions.

One advantage of the collateral based approach is that it is more likely to distinguish positions by underlying risk. Currently, ABCP have a smaller spread based on a qualitative factor: less exposure to subprime and of that more is earlier vintage. However, there is variation among ABCP positions and the collateral based method would take that into account. One way to check that would be to compare prices or implied spreads between the two on a deal by deal basis. That kind of detailed comparison does not seem to be part of regular reporting.

Valuation chronology

For additional perspective on the current valuation method it is useful to review the history. One theme is inconsistent valuation methods. Trader determined market observables of comparable deals were used to value Cash CDOs and inventory tranches of the ABS correlation desk. The more fundamental approach of relating prices to underlying collateral via the correlation model was available, at least on the ABS Correlation desk, but only used for bespoke single tranche CDOs and not inventory tranches. Super Senior positions were marked at par even as markets deteriorated and they were not valued using the correlation model until desk management changed. London Product Control did begin adjusting those values in June, but Product Control in NY did not.

End 2006 – the baseline

NY Cash CDO: “MTM to observables” Traders mark positions using recent market deals to get comparables and determine the prices/spreads for positions on their books, a version of matrix pricing that is also used for corporate bonds. Super Senior positions marked at par, reflecting the consensus that they were riskless. Liquidity Puts marked at the discounted value of the fees, at that point they were far out of the money relative to market ABCP rates.

ABS Correlation: Two books (a) Bespoke single tranche CDOs where the client takes a single tranche in line with the original business model for the desk, marked with correlation model using underlying collateral prices/spreads and an assumed correlation input (40%). (b) Inventory tranche, the new business model where the client takes equity and the desk looks to move mezz and senior over time, priced by MTM to observables as on NY Cash CDO desk. Super Senior positions marked at par (12-18bp).

June 2007

NY Cash CDO: No change in valuation methods, large hits at the end of the month, P/L -42mm.

ABS Correlation: London Product Control moves marks on Super Senior out to 31-34bp based on spreads observed on a couple deals. Mezz still hand marked. P/L -40 million.

July 2007

NY Cash CDO: No change in valuation methods, large daily hits mid month, P/L -56mm.

ABS Correlation: Product Control moves marks on Super Senior out to 41-44bp. Head trader gone, new management runs correlation model and takes a big hit, P/L -547 million.

August 2007

NY Cash CDO: Severe market disruption spreads to CP market and to avoid Liquidity Put exercise the bank steps in and starts bringing ABS CP (ABCP) onto the balance sheet. Active discussions on how to value positions in a market that had seized up with no observable trades. Bad days and bad weeks from mid-Aug on, P/L -46 million.

ABS Correlation: No change for SS, correlation model inputs updated. P/L -83 million.

September 2007

Positions on both desks get same valuation approach: all SS use DCF + 20bp discount margin. The actual spreads for discounting include the contract rates, so for Cash CDO SS the weighted average spread was 44bp, and for ABS Correlation SS 34bp. The rationale was that AAA (corporate bonds) spreads had increased around 20bp during October. Initially the ABCP associated with Liquidity Puts was going to be kept at par and the LPs themselves kept at discounted fees, that is, no change from par. But external auditors were skeptical and eventually the ABCP got a 20bp discount margin to be consistent with other SS. Mezzanine exposures were run through correlation model, now updated for event of default triggers and essentially written off. Loss of \$600 million on all Super Senior, another 130 million on mezz. By business unit: Cash CDO -655 million, ABS Correlation -81 million.

Notes: (1) There was debate over how to recognize the losses on the LPs. The decision was to mark down the ABCP and leave the LPs at discounted fee value. Some argued for keeping the ABCP at par and recognizing losses on the LPs. (2) For hedged SS, the exposure is marked down and the hedge is marked up to show a net impact of zero.

8K disclosure early Nov 2007

DCF with 250bp discount margin (\$8B) and Collateral Analysis (\$11B) were the basis of the bank's announced range for potential additional writedowns. The analysis and repricing were driven by various events. Rating agencies announced downgrades of ABS securities at the beginning of Oct and by the end of the month had downgraded or put on watch associated ABS CDOs. Merrill Lynch announced large writedowns. Market spreads deteriorated in October.

Oct 31 marks

DCF + discount margins that vary by SS type:

ABCP	225bp
SS HG	650bp, one deal uses 225bp
SS Mezz	775bp, one deal kept at par
SS CDO2	1258bp for long, 3548bp for short

Method for determining spread levels in the DCF model was refined. The desk produced shadow ratings of positions, guessing the extent of downgrades yet to be announced by the rating

agencies. Spreads in the CLO market by rating were mapped to the positions by Super Senior deal type as shown above. The total markdown on Super Senior was \$6.5B along with another \$2.4B on Lending and Structuring exposures (outside the Bank).

By business unit: Cash CDO -\$6.2B, ABS correlation -\$2.5B.

Nov 30 marks

Values for end-Nov just out so don't have details but shadow ratings were updated (some up, some down) and CLO spreads were higher. Cash CDO: -\$1.8B, ABS Correlation -\$1.1B.

Potential for additional writedowns

There is substantial risk of more writedowns.

- Market conditions could continue to deteriorate: Spreads are loosely tied to the CLO market which is still open though at much lower volumes. Further increases in CLO spreads either from higher risk premiums or market disruption could occur.
- Performance of subprime loans will continue to be revealed and it could come out worse than currently forecast. The potential for fraud to front-load defaults is not yet known but is a concern of the bank. Ratings agencies may have to go through another round of re-ratings.
- Possible change in judgment on appropriate spreads: If the bank moved to subprime ABS related market information, the discount margins would likely be higher.
- Greater precision in analysis of deals: The current approach is still high level and does not factor in all the considerations that could distinguish deals by expected CF, risk, and spreads. Additional analysis could reveal weaknesses that are not yet evident.
- Markets could begin to trade again but at lower prices.
- Collateral based analysis shows lower values: This is a reasonable alternative pricing approach, more directly tied to market information that indicates larger writedowns.
- New management of the bank and the subprime positions could decide to make changes to the valuation method to take more a hit now.

Of course, some of these factors could turn out better than expected. But on balance the trend is negative with considerable downside risk.

Legal Entity booking

In general, across all businesses, the bank is the preferred entity for derivative transactions because it is a preferred counterparty while the broker dealer holds cash securities.

- Liquidity Puts: all provided by the bank to support the credit rating of the ABCP of the SPVs. When the associated ABCP was purchased it came onto the bank's books. There was an initial mistake, the first set of ABCP was booked on the broker/dealer but that was corrected.
- US Cash CDO: The warehouse is exclusively in CFPI, a non-bank entity. Primary (unsold) and Secondary cash CDO inventory is held solely in CGMI, the US broker/dealer. Limited activity in derivatives, CDS/TRS on CDO tranches that are booked in the bank. For the positions included on the 8K disclosure that came from the Cash CDO desk, \$3.1B was held in the bank, \$6.7B outside the bank.
- ABS Correlation: CDS on ABS were mixed between CGML and the London branch of CBNA, tranches of synthetic CDOs on ABS were mainly in CGML. There was trend to use CBNA London for more recent trades. As of the 8K disclosure, SS positions were \$6B in the bank and \$2.3B non-bank.