

Valuing Illiquid Investments
Ideas on Principles-based Pricing



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Mark-to-market pricing has several important attractions. It is objective, leaving less chance for institutions or investment professionals to deceive their constituents. In normal circumstances it is easy, economical, and can be universally applied and interpreted. Recent experience, however, brought to light the danger in forcing upon financial institutions an inflexible accounting regime that: 1) does not accommodate for periods of illiquidity; 2) relies on third-parties with conflicting interest for asset valuations; and 2) creates asymmetry between asset and liability values.

Marking-to-no-Market - One thing we learned from the credit crisis: the “market” isn't always right. It wasn't right in the spring of 2007 when default rates implied by prices for sub-prime loans and RMBS were just 1%; and at the same time traders universally expected continued fast prepayments rather than the screeching halt we saw as refi options evaporated. Beginning in Q2 2007 deteriorating credit performance, global illiquidity, and the irrelevance of conventional ratings created dysfunctional trading conditions throughout the debt capital markets. For all intents and purposes the exchange process for RMBS broke down. Even when transactions occurred, it was nearly impossible to verify prices. It became evident to investors and auditors that in such periods traditional sources of market prices are biased and may rely on inadequate information or methodology. Moreover, as *busted* deals and fallen angels typically remain orphans, in that they lose their natural buyer constituency, a whole generation of RMBS has likely suffered permanently impaired liquidity.

WHAT IS FAIR VALUE?

In accounting parlance, fair value is the price received for selling an asset in an orderly transaction between anonymous market participants, not adjusted for transaction costs. With FAS 157, the US Financial Accounting Standards Board established guidance for setting the fair value of all financial assets.¹ For liquid assets trading in active secondary markets, valuations must reflect observable price quotes, recent transactions or primary issue prices for substantially identical assets. If prices cannot be established due to poor liquidity and lack of trading activity, an alternative approach is needed such that values approximate the proceeds received from a sale in a hypothetical, orderly transaction. This is the case for certain assets, such as Sub-Prime RMBS, suffering from both real credit troubles and the disappearance of market makers. Though it may not reflect an actual observable bid or transaction, fair value is required to be a market-based measure and its calculation should use assumptions knowledgeable market participants would use.

Pricing Hierarchy - Determining the most appropriate valuation method for a given asset is driven by the nature and market circumstances for such assets. To the greatest extent possible, valuations should be based upon observable market data from reliable sources.

¹ Every indication suggests the IFRS will follow the FASB by adopting valuing and reporting practices for illiquid assets substantially similar 157. Momentum is also building globally among regulatory authorities setting best practice guidelines and enforcing policies in this area. For instance, in January 2007 the Federal Reserve, Treasury, SEC and other agencies promulgate the Interagency Statement on Sound Practices Concerning Elevated-Risk Complex Structured Finance Activities. This Statement clearly defines the responsibilities of institutions and outlines three areas, or steps, each financial institution needs to take if they are aware that they may have complex structured financial transactions. Those three steps include 1) the identification, due diligence and approval process for having the exposure to these instruments, 2) the documentation around those instruments, and 3) general risk management principles for elevated-risk structured financial transactions.

Observable inputs are those derived directly from market data and unobservable inputs are an analyst's own assumptions about market participant behavior. With the goal of maximizing the use of observable market data and minimizing the use of non-observable data, a three-tier hierarchy is used to establish fair value for the universe of securities and derivatives.

1. Official Markets – Homogeneous securities and derivative products that trade in highly liquid over-the-counter markets or exchanges have reliable reporting systems for either live quotes or recent trades.
2. Indicative Quotes – Observable quotes and market clearing levels are often unavailable for less homogeneous assets. Even if they trade in deep secondary markets having several market makers, there is no common data repository or reporting system for price data. Legitimate dealers or brokers who formally or informally represent them may furnish real or indicative bids for individual assets. The quality of such information depends on technical market factors and inventory positions of specific dealers. Verification, as well as some experienced judgment, is needed to assess the dependability of quotes.
3. Principles-based Pricing – If reliable indicative quotes are not readily available, market yield or spread levels may be used to impute values. The yield assumption for an asset may be appropriate if it is associated with a benchmark or representative asset that is substantially similar in every key aspect. Optimally, the information will be continually published and its source an unbiased market participant. In some circumstances – either because the market is so dysfunctional or a particular investment is “busted”-- neither market prices (observable bids, recent transactions) nor reliable benchmark yields are available. Usually published by banks and dealers in good times, benchmarks may be no longer available or effectively worthless.

THE CHALLENGE ILLIQUID ASSETS

The combination of real credit troubles (especially for US residential mortgages), associated dysfunctional trading conditions and capital inadequacy created tremendous challenges for those holding structured credit products. In many instances, collateral losses have been orders of magnitude higher than levels contemplated by deal arrangers, making already complex securities even more difficult to evaluate as credit enhancement proved gravely inadequate. Furthermore, suffering from grossly inadequate transparency even in good times – independent valuation, risk measure, legal structure (investor/agents' rights and responsibilities), collateral attributes, collateral manager fitness – investors' inability to gather information has become profound. The fallout has been: 1) material divergence between securities' intrinsic and market value, and 2) valuation, risk assessment and performance measurement are more difficult than ever. As if this wasn't enough, auditors and regulators are applying more pressure on managers to determine values on their troubled assets, while often giving insufficient guidance in respect to acceptable methodology.

Practical Considerations - Certain sectors of the structured credit markets become completely illiquid -- no observable bids, transaction prices or benchmark yields -- in the summer of 2007. Such assets became classified as *Level 3* under FAS 157 (prices not corroborated by observable market data), and require some principles-based or “mark-to-model” pricing approach. Examples include: junior and non-investment grade RMBS, CDOs (ABS CDOs, CLOs, CRE CDOs, TruPs and TruPs CDOs, ARPs, CDO²), junior and non-investment grade CMBS, CMO residuals, CDO equity, portfolio/index trades,

bespoke synthetic transactions and other esoteric securities and derivative products. These esoteric assets have multiple levels of securitization such as CDOs, be private or highly customized deals with complex legal structures, synthetic components or challenging collateral. They may also include fallen angels, securities on rating agency downgrade watch lists and distressed transactions (busted or likely to break structures). Estimating values for such assets may require extensive collateral analysis and cash flow modeling and involve the use of interpolation techniques.

Role of Judgment – A sound methodology for measuring fair value of an illiquid asset would entail the use of: 1) a reasonably established and defensible theoretical framework, 2) conventions generally accepted by professionals trading substantially similar assets, and 3) market information that is both reliable and appropriate for the analytical framework. Analysis requires both risk and cash flow modeling and experienced judgment based upon capital market expertise necessary to interpret results within the context of industry conventions and dynamics. Assumptions underpinning valuation estimates for illiquid assets should be market-based where possible and obtained from reliable and independent sources, requiring a degree of expertise, interpolation and judgment.

It is necessary to decide, for instance, the appropriate discount rate given a bond's unique risk/return profile. Benchmark yields used for interpolation should have some relationship to current and/or historical yields for comparable assets. This means valuation teams must have expertise across several disciplines, including trading, quantitative research, credit analysis and structured finance.

RECOGNIZING OTTI

In the event market liquidity dries up, should institutions be obliged to value their assets at levels that reflect this unusual circumstance, even if they intend and have the ability to carry such assets? Shouldn't the definition of Fair Value (and Other Than Temporary Impairment) and associated calculation methodology be broad enough to develop values on subject assets even if bids for the specific assets are unavailable or egregious? Relevant accounting guidance provides flexibility to accommodate various market circumstances, yet imposes methodology discipline as well as disclosure standards to ensure statements fairly represent companies' economic situation. This position is not a compromise. It simply reflects the facts that conventional practices of obtaining market prices for individual assets may be fraught with error and interest conflicts -- investment banks that created and trade assets for profit may consider their own positions when "pricing" for clients. However, too much room still exists for interpretation with respect to implementation. Preferring to pass judgment rather than recommend specifics practices, if auditors and regulators desire consistency in application, they (with the support of industry associations and regulators) need to more actively promulgate recommended best practices guidance on acceptable methodology.

Accounting Guidance - The most relevant rules in respect to OTTI are FAS 115-1 ("The Meaning of Other-Than-Temporary Impairment and its Application to Certain Investments") and EITF 99-20 ("Recognition of Interest Income and Impairment on Purchased and Retained Beneficial Interests in Securitized Financial Assets"). FAS 115-1 defines an impaired security as one where the "fair value of the investment is less than its cost", and other-than-temporary impairment as situations whereby the investor "will be unable to collect all amounts due according to the contractual terms of a debt security not impaired at acquisition..." If impairment is judged to be other than temporary, an investment should be written down to fair value, thereby establishing a new cost basis, and the amount of the write-down must be included in earnings as a realized loss.

The pertinent aspect of EITF 99-20 is its instructions on impairment recognition based upon actual or expected changes in amount or timing of cash flows. Our interpretation of proper application of EITF 99-20 is investors are expected to recognize impairment on a security when the present value of such security falls below its current cost basis due to more severe assumptions about credit losses. If an adverse change is deemed to have occurred, a new cost basis should be established for the subject asset, and future income should be accreted based on new cash flow projections. Given this, we believe recognition of impairment losses requires more than just a fall in a security's price. A price decline may be material, but may also reflect temporary liquidity problems for an individual security or a market sector. Upon ascertaining that an investment has unrealized losses due to a decline on market price, the next step is perform thorough credit analysis to either confirm or refute whether the price drop, or some other indication of possible credit problems, is a symptom of a likely ultimate losses.

PRINCIPLES-BASED PRICING

The procedure used to value contractual cash flow from any asset or derivative product should reflect specific structure and market circumstances. Prices determined through a principles-based approach require increased supporting disclosure validating the theory behind the approach, the robustness of its application, and critical modeling assumptions. SCS has collaborated with accountants, auditors, regulators and actuarial consultants to establish a framework incorporating main aspects of FAS 157 and other relevant guidance and rules. Our independent position and transparent models enable SCS to work closely with clients and their constituents to achieve the best situation-specific solutions.

Fundamental Principles – In principles-based pricing, another hierarchy pertains relative to selection of modeling framework. The intrinsic value of any asset (or derivative) is the present value of such asset's cash flow. The pricing exercise, then, can be summarized as determining: 1) the expected and potential range of cash flow streams, and 2) the appropriate rate (or rates) for discounting the cash flow. When it is determined that pricing requires a model, the first step is to establish the amount and quality of market-related information available to derive above pricing factors. SCS applies the following guidelines for selecting and implementing valuation procedures:

1. When attempting to establish fair value, maximize use of relevant market information.
2. For thinly traded assets where market information is sparse, modeled valuation should strive to maximize the use of more granular, current information.
3. As much as possible, contractual details such as priority of payments and cash flow diversion triggers should be applied.
4. For projections that do not use *market-implied* inputs, discounting should embed an appropriate risk-premium over a benchmark risk-free rate.
5. Where possible, valuations should be validated against observable measures of related instruments in the market.
6. The analyst performing valuation services must be free from conflicts of interest.

Comparative Methodologies – Two general modeling frameworks – defined by the market information content that informs their respective model inputs – have been embraced by both financial theoreticians and market practitioners. Selection of one methodology over another is governed by the quality and source of “benchmark” information that might be used as model input, and the *nearness* of the benchmark to the subject asset.

Risk Neutral Approach

Valuation systems with the richest information content are models having “market-implied” inputs. When market convention has settled on a framework, model inputs are supplied based upon direct market observations, and valuations are exposed to arbitrage through liquid instruments in related markets, valuations for an instrument may be determined on a “risk-neutral” basis even though no direct market quotes are available for the instrument in question. An example would be a price for a tranche of a CDO backed by a corporate debt pool similar to a CDX constituent, derived from a Gaussian Copula model using CDS or bond spread information to determine default rates. Risk Neutral approach combines observations of security spread premium over riskless securities of similar tenor with an assumption about recovery in the event of default, to derive the markets’ forecast of impairment. A critical assumption in the analysis is the portion of the full risk premium attributable to credit risk, versus factors such as liquidity or optionality.

Structural Model Approach

Structural models are systems relying on the least amount of market information, rather cash-flows projections are based on analysis of underlying non-market relationships. Securities valued through such a framework trade infrequently or do so under duress. The structural models may be information rich, but complexity and/or illiquidity make market prices difficult to observe. An example of this approach is using a credit-default model to project underlying issuer performance, running resulting cash flow through a structuring tool to generate the expected possible range of tranche cash flows. Choosing an appropriate risky discount rate, that reflects the timing and volatility of cash flow, is complicated by absence of liquid assets directly comparable with these idiosyncratic products.

A hybrid of the Structural and Risk Neutral models may be appropriate for valuating assets within certain structured credit sectors. This approach entails deriving the market’s forecast of collateral asset performance rather than of the subject assets. While market information is absorbed in the generation of model drivers, model systems intermediate in the use of the information and valuations cannot be arbitrated. An example would be a system that values a CDO tranche backed by a pool of TruPs securities using equity prices and volatilities of the issuers to estimate default probabilities for asset pool constituents. This approach is commonly described as the Merton Model, named for Nobel Laureate Robert Merton. (see *TruPs Credit and Valuation Methodology*) In this approach, where the capital markets are used in the projections of collateral performance but not the subject asset, an appropriate risky discount rate must be selected to develop a fair value estimate.

VALUING RMBS

Fundamental Credit Assessment - Valuation of structured credit products requires a systematic three-level analytical approach. Analysis at each level -- collateral, structure and collateral manager/servicer -- needs to be both rigorous and thorough. For a security linked to residential mortgage loans, loan-level credit analysis is vital to measuring tranche value and potential performance variance. Proprietary analytics examine credit quality and prepayment expectations of each borrower in an RMBS deal, developing a unique loss and prepayment projection for every security. Relative credit strength is determined by analyzing numerous performance indicators, such as projected loss, breakeven multiple and sensitivity to increased losses, once an initial write-down is experienced.

Accurate loss and timing projections require a credit model based upon both loan-type and borrower attributes, with a learning facility to incorporate the introduction of new loan products and changes in

underwriting standards. Such a model should also consider the relationships between the explanatory variables and macroeconomic factors to gauge the sensitivity of losses to changes in general and local economic conditions.

Pricing Methodology - The following is a description of the procedure for developing the indicative prices for RMBS and ABS CDOs:

Establishing Market Risk Premium

1. Because ABX prices are now the most robust and continuously available source of market information, it is the best link with the RMBS market for this valuation exercise. From the risk premium embedded in the various ABX series and classes, we can reasonably impute the risk premium for individual Subject Assets.
2. The first step is to derive prices for individual reference assets that are consistent with prices for ABX classes. This is accomplished by establishing the level of stress (required confidence level) implied by market prices for the ABX classes. The difference between the derived percentile and the 50th percentile (expected scenario) is indicative of the market discount for risk. Actively traded securities where actual trade levels can be obtained may be included along with the ABX to establish a derived percentile.
3. SCS's proprietary loan-level mortgage credit model generates a distribution of cash flow streams for each reference security comprising the respective ABX series.
4. Projected cash flows under the various scenarios are discounted at forward Libor rates to create a distribution of individual reference security prices.
5. Prices derived from specific distribution percentiles are averaged across ABX security constituents. This process is repeated for respective percentiles to create a distribution of indicative potential model-based prices for ABX tranches.
6. The distribution percentile that minimizes the difference between modeled and observed ABX class prices indicates the appropriate imputed Market Risk Premium.

Determine Provisional Valuation

1. The Imputed Risk Premium is applied to individual Subject Assets.
2. Provisional Prices are established by discounting the cash flows generated under the implied percentile scenario at forward Libor rates.

Screen and Corroborate

1. Provisional Prices are subject to certain checks. Such checks may change over time based on product type and market circumstances. Current checks for RMBS include:
 - a. price above 96
 - b. price is below 10
 - c. deviation in excess of 10% from price derived by the Alternative Approach (described below)
2. When it is deemed appropriate that a Provisional Price be reviewed further, details of the security – including structure, historical performance and credit profile – are studied intensively.

Adjustments to the preliminary price may be made by changing the applied percentile cash-flow, modifying certain assumptions used in the generation of the security cash-flows or modifying the discount rate. A committee must agree to adjustments from modeled prices.

Validation by Alternative Approach

1. The Alternative Approach pairs fundamental credit analysis with soft price observations to develop risk-adjusted discount rates. Indicative prices are collected from various sources including broker-dealers, investors, pricing services, trade observations, offerings, bid lists, CDO/SIV liquidations, and discussions with market participants.
2. Statistical interpolation methods are used to populate a grid of market yields or spreads, as appropriate. SCS continuously refreshes its sample price-point data to capture current market circumstances.
3. Individual Subject Assets are mapped to the grid based upon certain proprietary credit metrics (specific metrics used in the model may change with market dynamics, imputed from behavior of market participants).
4. The price of a Reference Asset under the Alternative Approach is the present value of its expected cash flow using the risk-adjusted discount rate that most appropriately reflects its credit profile.

INTERNAL POLICIES AND PROCEDURES

Valuation and impairment practices, especially for illiquid assets, should be based upon validated theory and robust application. As important as core principles underpinning the methodology or actual input selected for analysis, however, are internal policies that clearly define and document procedures (authority, responsibilities, disclosure rules) and have been appropriately sanctioned. Moreover, a compliance structure, similar to that used to monitor risk management activities, should be introduced to ensure methods are applied diligently and consistently.