ANDREW DAVIDSON & CO., INC. the Pipeline

Valuation Update – Oct. '07

Credit OAS: Next Steps and Challenges

By Alex Levin

AD&Co.'s implementation of Credit OAS has progressed well beyond its first steps reported in the April and May Pipeline articles. We are now able to value a cohort of loans efficiently. This capability is useful for whole loan portfolio management and the assessment of a loan guarantee business (like that of the GSEs). We can also value CMOs and ABS (as well as ABX indexes) using loan-level simulations linked to INTEX cash flow generators. This article reviews the next steps and challenges for the completion of our goals.

Credit OAS Basics

Credit OAS is a valuation method that employs coupled simulations of interest rates and home prices. Along each random path, prepayments, defaults, delinquency and severity rates are generated with the LoanDynamics™ Model (LDM). We can produce the value of the actual instruments (with all desired Greeks) or the value of losses only.

Naturally, the market factors, interest rates and home prices, should follow risk-neutral dynamics observed in other markets. There is no need to discuss a risk-neutralization of interest rates – this is an established process. However, other aspects of risk-neutral valuation of credit-sensitive MBS are not well established.

Home Prices and Greeks

With regard to home prices, the US real estate derivative market is being developed. For example, last month, ICAP (http://www.icap.com) started trading derivatives using Radar Logic's daily indices. Last year, Chicago Mercantile Exchange (CME) established a similar market using S&P/Case-Shiller's monthly indices. These markets, if large in size, can deliver instruments that hedge against credit losses – to the extent explained by home prices. In addition, practically all dealers trading ABS and ABX provide their own forecasts of home prices. Those should be used with caution because (A) for any market factor, there is generally a difference between risk-neutral and physical expectations, and (B) we have already seen predictions that looked outrageous from day 1 and never materialized. For instance, many analysts talk about the real estate bubble and expect home prices to decline materially in the next few years; these views are hardly in line with the OFHEO historical record dating back to 1975.

AD&Co.'s Credit OAS system has been linked to the HPI stochastic process (see my 2006 and 2007 AD&Co Conferences Presentations for more details). The process can be risk-neutralized by changing two mathematical variables: the long-term equilibrium and the initial diffusion. In practical terms, we can alter the long-term behavior and the short-term behavior rather easily. For

example, by using real estate forward contracts we can change the model to best approximate the forward HPI curve.

In addition, we incorporated "HPI Greeks," i.e. duration and convexity to the change in long-term and short-term HPI rates. These are important measures for hedging the real estate risk embedded in MBS and ABS. For example, when analyzing the CW0708 sub-prime deal, we found that the collateral losses and their Greeks generally agree with the option theory. The HPI convexity of losses is positive (default is an option!), but becomes close to zero for bad loans and bad home price scenarios (i.e. with a deep in the money default option). The duration of losses to the long-term HPI rate is found to be about 5 – 10 years; exposure to the short-term HPI rate is about 2 – 3 times smaller. As usual, a 5 year duration means that "instrument" (the loan's loss piece in our case) will go up 5% in value when the HPI rate is down 1%. Note that the duration of losses can be expressed relative to the price of the bond (up to 0.75 yr for the same deal) rather than the value of losses.

Static Versus Stochastic

Theoretically, in the presence of any convexity, the stochastic framework cannot be omitted without loss of accuracy**.** During my talk at the 2007 AD&Co Conference, I illustrated the role of randomness: deterministic HPI forecast may understate a loss estimate by 25% for a cohort of loans. For ABS tranches, which are purposely designed to be nonlinear in the credit structure, the difference between loss estimates obtained via static and random HPI forecast can be substantial. In fact, we expect that senior tranches cannot be fairly valued using the static framework – their prices reflect potential losses that can materialize in adverse HPI cases only.

For any particular credit protection, the HPI volatility effect can be replaced by an artificial loss-equivalent single static scenario. However, such a scenario can't be selected universally across the capital structure. Suppose we have a AA tranche that is fully protected unless losses reach 25%. The tranche's market quote carries a credit spread of, say 50 bps, which is equivalent to a 2 point price discount. A single HPI scenario that triggers such losses in the AA tranche is likely to fully demolish junior and mezzanine classes and thereby contradicts their observed market prices. The AD&Co Implied Default Model (IDM) synthesizes a default rate distribution rather than a single default rate in order to explain market quotes across credit protection layers. The default rate distribution, in turn, can be explained by the HPI randomness thereby connecting the IDM and the Credit OAS concepts.

Risk-Neutral LDM

Although ABS investors have many reasons to fear an adverse home price development, they can hedge using available and growing real estate derivative markets. The other component of credit risk is the risk that the model (such as the LDM) understates losses. AD&Co.'s LDM has many tuning dials that can accelerate or decelerate inter-state transitions and loss severity. They can be used for both tuning the model to better match historical experience (physical tuning) and to compensate for the price of model risk (risk-neutral tunings). The latter is reminiscent of our work on risk-neutrality in prepayment modeling. Even with constant interest rates, the prepayment process can be uncertain and a model can be biased. Similarly, losses are somewhat uncertain even in the complete absence of market volatility.

The most efficient and transparent tunings in the LDM are the FICO tuning and the original LTV tuning. Similar effects can be obtained using the "C to D" tuning (Current to Delinquent, i.e. the delinquency process) and "S to T" (Severely Delinquent to Terminated) loss severity tuning. The FICO tuning alters borrower's credit artificially, hence, making him/her more or less likely to become delinquent. The LTV tuning influences the default option's moneyness, hence, the default rate and loss severity.

AD&Co. is not currently in a position to appropriately separate HPI risk from the LDM model risk. This opportunity itself is a function of the real estate derivative market. However, we are up to the task of bringing each type of risk into the valuation process in a rigorous manner.