

## **Brennan, Heindl and Poon (2008)**

### **Tranching and Rating, Executive Summary**

Approximately \$471 billion of the \$550 billion of collateralized debt obligations (CDOs) that were issued in 2006 were classified by SIFMA (Securities Industry and Financial Markets Association) as 'Arbitrage CDOs', defined as an 'attempt to capture the mismatch between the yields of assets (CDO collateral) and the financing costs of the generally higher rated liabilities (CDO tranches)'. In the simple world of Modigliani and Miller (1958) such arbitrage opportunities could not exist, which raises the issue of the source of mispricing in the markets for CDO's and other structured bonds. In this paper we present a simple theory of the effect of collateral diversification and the tranching of debt contracts on the degree of potential mispricing of structured debts. The theory can account for the apparent arbitrage opportunities that were offered by the market for CDOs and help to explain the explosive growth of that market until the subprime crisis. Using the CAPM and Merton model, we derive yields on corporate bonds and on equally rated tranches of structured bonds and explore in more detail the reasons for differences in the equilibrium yield spread between the two types of debt security.

Many investors are not able to access information on the value of the debt securities issued by the special purpose vehicles (SPV). These investors rely instead on credit ratings provided by rating agencies. Here, we make the assumption that securities can be sold at yields that reflect only their ratings. This assumption is motivated by several considerations, first of which is the attention focused on ratings in the marketing of such securities. Second is the concern expressed by the SEC (Securities and Exchange Commission) 'that certain investors assumed the risk characteristics for structured finance products, particularly highly rated instruments, were the same as for other types of similarly rated instruments', and 'that some investors may not have performed internal risk analysis on structured finance products before purchasing them.' Thirdly, this assumption provides a baseline for assessing the need for differentiated ratings for structured products as has been suggested by the SEC under Proposed New Rule 17g-7. Anecdotal evidence of reliance on ratings for risk assessment is provided by the *Financial Times* (December 6, 2007) which reports that 'for many investors ratings have served as a universally accepted benchmark', and 'some funds have rued their heavy dependence on ratings'. Regulators also rely on the reports of the rating agencies: 'As regulators, we just have to trust that rating agencies are going to monitor CDOs and find the subprime', said Kevin Fry, chairman of the Invested Asset Working Group of the U.S. National Association of Insurance Commissioners. 'We can't get there. We don't have the resources to get our arms around it.' (International Herald Tribune, June 1, 2007). Even UBS, an investment bank that originated large numbers of structured securities and incurred substantial losses in the subprime crisis, refers to its own 'over-reliance on ratings' as a factor in its losses. Our assumption is also consistent with the evidence of Cuchra (2005) who reports that ratings explain 70-80% of launch spreads on structured bonds in Europe. He also finds that the importance of credit ratings in structured finance (yields) seems to be far greater than in the case of straight (corporate) bonds.

It is straightforward to show that a system which relies only on default probabilities is easy to game - by selling securities with lower recovery rates than the securities on which the ratings are based. Only slightly more subtly, a system which relies on expected default losses is also easy to game. This is because a simple measure of expected default loss takes no account of the states of the world in

which the losses occur. The SPV may profit then by selling securities whose default losses are allocated to states with the highest state prices per unit of probability. Rating agencies, by providing information about probabilities of loss or expected default losses, are providing information about the total risk of the securities that they rate. Although it has been well known for over forty years that equilibrium values must depend on measures of systematic rather than total risk, this insight has not so far affected the practices of the credit rating agencies.

In this paper we analyze the source and magnitude of marketing gains from selling structured debt securities at yields that reflect only their credit ratings, or specifically at yields of corporate bonds that have the same rating. In this setting, we show that with a rating system that is based either on default probabilities (e.g. Standard & Poor's and Fitch) or on expected default losses (e.g. Moody's) the optimal strategy for the issuer is to maximize the number of tranches. If the risk characteristics of the collateral can be chosen, then they will be chosen to have the maximum beta and the minimum idiosyncratic risk. A rating system that is based on expected losses (e.g. Moody's) reduces, but does not eliminate all of, the pricing anomalies and the issuer's marketing gains.

Our analysis is most closely related to that of Coval et al. (2007) who show that it is possible to exploit investors who rely on default probability based ratings for pricing securities, by selling bonds whose default losses occur in high marginal utility states. However, their theory has no explicit role for debt tranching as ours does. They use a structural bond pricing model to predict yield spreads on CDX index tranches and conclude that there is severe market mispricing: the market spreads are much too low for the risk of the tranches, and this is particularly true for the highly rated tranches. In contrast, our model suggests that highly rated tranches will be subject to the least mispricing, and that the highest marketing gains will come primarily from the junior tranches. This is consistent with the fact that UBS is reported to have retained the 'Super Senior' AAA-rated tranches of the CDO's it originated, while selling the junior tranches to third-party investors.

The fact that tranching is most often seen when the underlying assets are a diversified portfolio of securities is consistent with our finding that it is optimal for the investment bank to write the tranching securities against a portfolio with the highest possible component of systematic risk. A portfolio of  $n$  A rated CDO tranches will in general be much more risky than a portfolio of  $n$  A rated bonds issued by corporations. One important implication is that defaults of tranching securities of a specified rating will tend to be much more highly correlated than defaults of securities of the same rating issued by a typical undiversified firm - in the limit the defaults of the tranching securities will be perfectly correlated. This, together with the systematic event of a decline in underwriting standards and a bubble in house prices, accounts for the fact that we see almost all highly rated securities issued against portfolios of subprime mortgages made in 2006 and 2007 experiencing ratings deterioration at the same time. This has profound implications for regulatory systems for bank capital that depend on bond ratings. An analysis of the regulatory implications of credit rating systems is beyond the scope of this paper. But our analysis does have implications for the emerging debate as to whether structured products should be rated on a different scale from other credit instruments.

*5 September 2008*