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## A MATTER OF PERSPECTIVE

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**Moody's Risk  
Management Services**

**risk waters group**



## Moody's Risk Management Services

### A Matter of Perspective

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The field of financial risk management has advanced at an increasing rate in the last ten years. Data collection for the enhanced analysis of market moves and credit losses has expanded dramatically. Advanced techniques for the quantitative estimation of Value-at-Risk have emerged and portfolio theory and other quantitative techniques have entered and received wide acceptance in the once traditional world of bank lending. These efforts have progressed to such a level that the recently proposed Basel Capital Accord contemplates relying upon internal risk models in certain cases. Our firm, Moody's, has itself undergone a shift in which fundamental credit analysis and quantitative methods coexist symbiotically.

As risk management analysis and systems become more sophisticated, it becomes ever more important to step back and appreciate how the many pieces of these systems work together in support of the overall goal.

#### Are modeling efforts proportionately applied across the risks?

In our research, in addition to exploring models for things like probability of default, we have also found it useful to address relatively less well-developed aspects of empirical credit risk analysis at present.

For example, validation is a topic which dramatically affects model interpretation and usage but has received proportionally less attention in many research agendas. Nevertheless, it is important for understanding model risk and it is tangible enough to have been addressed in the recently proposed Basel Accord. Concerns here include questions such as: Is the model stable within our historical experience? Is it somehow "over-fit" to the data upon which it was developed? Has it been validated in out-of-sample testing? Is there even sufficient data to demonstrate differences between two models? Certainly model validation is an important concern and our own group at Moody's Risk Management Services is pleased to have added to the growing literature on this front and advocated for more rigorous testing of credit models.

More generally, we have observed that there are still systematic

gaps in the treatment of some of the factors affecting expected credit losses, and that the effort expended by organizations to reduce this gap is often disproportionate to their impact on the analysis. It is not the case that too much effort is being spent on some aspects, but rather that not enough is being spent on other, equally influential ones.

For example, correlations between market movements and credit events largely elude risk managers, and despite a variety of research efforts, there is still no universal model of liquidity premiums in fixed income. Even relatively simple dimensions of risk such as the potential correlation of recovery rates across a credit portfolio are often left aside and thus assumed to be zero.

As a result, analysis may be coarsened or even invalidated by combining a barrel full of high quality analytics with a teaspoon of crude estimates.

#### Revisiting Loss Given Default: An example of proportioning risk management efforts

Our efforts here are not to stretch the limits of what can be imagined, but simply to strive for what can be implemented within the limits of a practical system for risk management. In what follows, we explore one aspect of this through the tangible example of Loss Given Default (LGD) estimates.

Consider the case of trying to estimate the risk of credit loss. In the simple case of a ten-year corporate bond, an assessment of the potential credit losses (CL) would require an estimate of perhaps three variables: its probability of default (PD), its exposure at default (E@D) and loss given default (LGD).

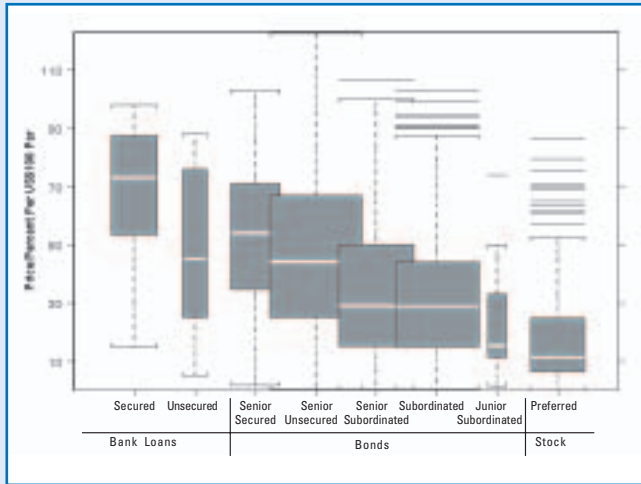
$$\mu_{CL} = \mu_{PD} \cdot \mu_{E@D} \cdot \mu_{LGD}$$

We show the formula here not to review elementary statistics, but to underscore that these three parameters can influence the risk assessment in a symmetrical and direct way. The symmetry implies that an error of proportion in any of the three quantities affects the analysis identically. Yet in practice resources and empirical efforts employed to estimate these parameters are typically highly disproportionate. Many disparate and advanced modeling techniques have been applied to the problem of estimating PD: from advanced statistical methods to structural models to hybrids such as Moody's RiskCalc™.

In sharp contrast, calculation of the expected LGD is typically relegated to a simple table look-up algorithm based on segmenting historical averages, sometimes broken out by seniority class. We routinely hear that Moody's own annual default study is used as a common source for such exercises. But as underscored in the calculations above, risk parameters commonly act as links in a chain, and table lookups might well be the *weakest* link that determines the overall

worth of the risk management effort.

Consider the estimation of  $\mu_{CL}$  above, which would often have direct implications for calculations of CVAR, analysis of CDOs or default swaps, etc. The figure below, adapted from Moody's own



default study, shows the distributions (median and interquartile ranges) of recovery rates for the traditional look-up table that many institutions use for estimating LGD. It is clear from this figure that the variability or error rate of estimates based on this table can be expected to be fairly wide. When we extend this analysis using our proprietary database of recovery information, we find that, for example, using the traditional lookup table to estimate LGD for a senior subordinated bond, one could expect the average absolute error of the estimate (out of sample) to be over 20% on an average recovery of about 32%, or just under 70% of the estimate.

To illustrate the importance of this magnitude of error, consider the following stylized example: The same percentage absolute error rate in default probabilities for a buy-and-hold investor of a Baa rated senior subordinated bond with say, a 10 year maturity, would imply a default probability somewhere in the (very wide) "Aa-to-almost-Ba" range! Clearly for most credit-risk professionals this would be an unacceptable level of uncertainty around the probability of default measures. Thus, a good deal of money and effort are spent for improving the precision of these estimates, as ought to be. However, at the same time many analysts and portfolio managers tend to routinely accept this level of estimation error level in their calculations of expected recovery, despite the fact that the two sources of imprecision affect the overall estimate of  $\mu_{CL}$  symmetrically. (We assume E@D is 1.0.)

This relates back to the issue of proportionality. We feel that risk professionals have spent a tremendous amount of time developing

default prediction models and integrating them into their credit processes, while the same cannot always be said of LGD models.

To address this imbalance, we have undertaken research to extend the LGD research that Moody's has published over the last 5-years and develop it into a more accessible and tailored quantitative framework for specifically estimating the recovery rate and confidence bounds around LGD forecasts for specific obligations. We call this resulting tool Moody's LossCalc™.

Our analysis has led to some interesting research findings. Among these results, which will be published shortly, we observe that:

- Recovery rates fall when there are more frequent defaults in the market. This is true in the aggregate and we have suggestive evidence that it is true at the industry level.
- As in default probability estimation, capital structure can be important for recovery rate estimation. For example, the presence of debt more senior to the class in question affects recovery expectations.
- Secured debt recovers differently from unsecured debt in different economic climates. So the recovery rate gap between seniority classes changes and can potentially even cross over time.

Each of these findings go beyond what can be built into a simple historical table look-up of average recovery rates by seniority class. Thus, we found that it is important to understand and incorporate these dimensions into our risk management models.

There is nothing "wrong" with a descriptive representation of recovery data, analyzed in a traditional lookup table format. Nevertheless, the user of these traditional tables should be aware of the fact that analyses performed on these table alone may result in highly variable estimates of LGD. This is a result of the nature of the tables, not the quality of the analysis they contain. Our analysis reveals that inclusion of other factors, such as the effect of macro-economic cycles and proxies to the debt structure of the firm, provides more accurate estimates. Accordingly, Moody's LossCalc™ builds on this research by incorporating information at the instrument, firm debt structure, and industry levels, as well as information about macro-economic cycles.

By refining our research in areas like LGD that traditionally receive less attention, and by developing tools such as Moody's LossCalc™ to address these lapses, we hope to help fill in holes in the understanding and quantification of risk. ♦

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## Moody's RiskCalc™



Moody's Risk Management Services is committed to providing the highest quality, quantitative risk assessment models available—robust and consistent methodologies with globally-comparable outputs. This commitment is best exemplified by Moody's RiskCalc, our **web-based**, statistically powerful network of Probability of Default models.

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## Moody's Risk Management Services

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