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Benchmarking Model of Default Probabilities of Listed Companies

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9.1 Introduction

The Basel Committee on Banking Supervision is responsible for proposing capital requirements for internationally active banks. The Committee first proposed the Basel New Capital Accord, also known as Basel II, in 1999, with the final version (Basel Committee on Banking Supervision 2004) in June 2004. By year-end 2006, Basel II is expected to replace the original Basel Accord, which was implemented in 1988.

Basel II allows banks to choose among several approaches to determine their capital requirements to cover credit risk. The standardized approach allows less sophisticated banks to use external credit ratings to classify their assets into different risk classes. Over time, banks are expected to evolve to the internal ratings-based (IRB) approaches (foundation and advanced), which rely on their own experience in determining the risk characteristics of various asset classes according to their internal rating systems. For example, the foundation IRB approach for corporate, sovereign, and bank exposures allows banks to provide estimates of probability of default (PD) but requires banks to use supervisory estimates of loss given default (LGD), exposure at default (EAD), and maturity. The advanced IRB approach for such exposures allows banks to provide estimates of all these risk characteristics.

As credit risk measures are estimated by banks, systematic underestimation of such measures and the corresponding regulatory capital in a bank (or a number of banks) will increase the bank’s vulnerability to adverse changes in market conditions, in particular during a financial or banking crisis. The safety and stability of the banking system would thus be affected by whether credit risk measures are estimated in a sound and prudent manner. Therefore, the validation methodologies of IRB systems...
have emerged as one of the important issues of the implementation of Basel II. Validation comprises an assessment of the validity of the risk components EAD, PD, and LGD, and the underlying rating system itself.

For the validation of PDs, there are in general two stages: validation of the discriminatory power of a rating system and validation of the accuracy of the PD quantification. Compared with the evaluation of the discriminatory power, methods for validating the accuracy of the PD quantification are at a much earlier stage. While one of the methods is back-testing, a major obstacle to back-testing of PDs is the scarcity of data, caused by the infrequency of default events and the impact of default correlation. Even if the five-year requirement of Basel II for the length of time series for PDs is met, the explanatory power of statistical tests will still be limited. Statistical tests alone will be insufficient to establish supervisory acceptance of an internal rating system. Nevertheless, banks should be expected to use various quantitative validation techniques to detect weaknesses in a rating system.

Due to the limitations of using statistical tests to verify the accuracy of the PD quantification, benchmarking can be a complementary tool for the validation and calibration of PD estimates. Benchmarking involves the comparison of a bank's PD estimates to results from alternative sources. It is quite flexible in the sense that it gives banks and supervisors latitude to select an appropriate benchmark. An important technical issue is the design of the mapping from an individual bank's estimates to the benchmark. Benchmarking seems to be promising and would allow supervisors to make inferences about the characteristics of an internal rating system. It also appears to be part of the whole process of producing internally generated estimates at banks' IRB systems. For example, banks frequently use external and independent references to calibrate their own IRB systems in terms of PDs. Benchmarking internal PD estimates with external and independent PD estimates is implicitly given a special credibility, and deviations from this benchmark provide a reason to review the internal estimates.

This chapter proposes a benchmarking model for the purpose of IRB validation of listed companies, which is developed upon using a credit risk model and a simple mapping process. The credit risk model is based on the recent studies of the predictive capability of structural models. Black and Scholes (1973) and Merton (1974) have been the pioneers in the developments of the structural models for credit risk of corporates using a contingent-claim framework. They treat default risk equivalent to a European put option on a firm's asset value and the firm's liability is the option strike. To extend the Merton model, the structural models