Commentary

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I shall divide my comments into three parts: (i) general thoughts about credit risk modeling and the technical difficulties involved, (ii) remarks on the implementation of such models, with particular reference to the papers in this session by Wilson and by Nishiguchi et al., and (iii) a discussion of the policy implications of credit risk modeling and the light shed on this issue by the papers by Jones and Mingo and by Gray.

BACKGROUND

It is important to understand the background to the current interest in credit risk modeling. Recent developments should be seen as the consequence of three factors. First, banks are becoming increasingly quantitative in their treatment of credit risk. Second, new markets are emerging in credit derivatives, and the marketability of existing loans is increasing through growth in securitizations and the loan sales market. Third, regulators are concerned about improving the current system of bank capital requirements, especially as it relates to credit risk.

These three factors are strongly self-reinforcing. The more quantitative approach taken by banks could be seen as the application of risk management and financial engineering techniques initially developed in the fixed income trading area of banks' operations. However, they raise the possibility of pricing and hedging credit risk more generally and encourage the emergence of new instruments such as credit derivatives. Furthermore, if banks are adopting a more quantitative approach, regulators may be able to develop more sophisticated and potentially less distortionary capital requirements for banking book exposures. However, if regulators do permit the use of models in capital requirement calculations, banks will have a substantial incentive to invest further in the development of credit risk models.

The basic problems in developing models of credit risk are (i) obtaining adequate data and (ii) devising a satisfactory way of handling the covariability of credit exposures. On data, banks face the difficulty that they have only recently begun to collect relevant information in a systematic manner. Many do not even know simple facts about defaults in their loan books going back in time. Although serious, this difficulty is transitional and will be mitigated as time goes by and perhaps as banks make arrangements to share what data exist.

The more serious data problem is that bank loans and even many corporate bonds are either partly or totally illiquid and mark-to-market values are therefore not

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available. This means that one must rely on some other measure of value in order to establish and track the riskiness of credit-sensitive exposures. Two approaches have been followed by credit risk modelers. J.P. Morgan and Credit Suisse Financial Products in their respective modeling methodologies, CreditMetrics and CreditRisk$^+$, employ ratings and probabilities of ratings transitions as bases for measuring value and risk. The consulting firm KMV uses equity price information to infer a borrower's underlying asset value and the probability that it will fall below some default trigger level.

The second major problem faced by credit risk analysts is that of modeling the covariation in credit risks across different exposures. It is particularly difficult to do this in a tractable way while respecting the basic nature of credit risk, that is, return distributions that are fat-tailed and highly skewed to the left. Two approaches have been taken. On the one hand, the CreditMetrics approach to covariation consists of supposing that ratings transitions are driven by changes in underlying, continuous stochastic processes. Correlations between these processes (and hence in ratings transitions) are inferred from correlations in equity returns (to some degree therefore relying on the KMV methodology). CreditRisk$^+$, on the other hand, allows parameters of the univariate distributions of individual exposures to depend on common conditioning variables (for example, the stage of the economic cycle). Conditionally, exposures are supposed to be independent, but unconditionally they are correlated.

Implementations of Credit Risk Modeling

Two papers in this session represent implementations of credit risk methods, namely, those by Wilson and by Nishiguchi et al. The Wilson study describes an approach to credit risk modeling that resembles CreditRisk$^+$. More specifically, this approach employs binomial and multinomial models of default/no-default events and of movements between ratings. Correlations between the risks on different exposures are incorporated by allowing the probabilities to vary according to whether the macroeconomy is in one of two states. It is slightly difficult to see how such a framework would perform in actual applications. For example, it might be thought of as a problem that the economy can only be in a boom or a bust. Integrating over a larger number of states or over some continuous set of different states might be more natural.

Although the Wilson paper does discuss ratings changes, the primary focus (as in CreditRisk$^+$) is on probabilities of default. Credit losses are deemed to occur only if a borrower defaults and not if, for example, its rating declines sharply without default taking place. This approach resembles traditional practices in insurance and banking markets. By contrast, CreditMetrics takes a more portfolio-theoretic approach in which losses are registered as the credit rating of a borrower declines. From an economic viewpoint, the portfolio-theoretic approach appears preferable. For example, it more straightforwardly yields prescriptions about how a given credit risk may be hedged.

The Nishiguchi et al. paper resembles CreditMetrics in that it takes a more portfolio-theoretic approach. However, in its treatment of correlations, its approach, like that of Wilson and CreditRisk$^+$, is to allow exogenous conditioning variables to serve as the source of covariation in credit risk. Like the Wilson paper, the Nishiguchi et al. paper does not explore the effectiveness of the authors' very complicated approach to modeling correlation. Since correlations are crucial inputs to the credit risk measures that come out of such models, a critical evaluation of the sensitivity of the results to different approaches would be desirable.

Policy Relevance

The other two papers in this session, those by Jones and Mingo and by Gray, provide extremely useful snapshots of what U.S. and Australian banks, respectively, have achieved in their implementation of quantitative credit risk modeling. In both cases, it is notable quite how far the banks have gotten, although significant obstacles remain. Substantial efforts have been directed at collecting data and implementing credit risk measurement systems. Almost no banks follow a fully portfolio-theoretic

approach. Most employ ratings-based approaches like CreditMetrics or CreditRisk$^+$ rather than KMV techniques. Supervisors in both the United States and Australia have had extensive contact with banks, monitoring progress and, in the Australian case, coordinating the exchange of data.

For regulators, a crucial question that Jones and Mingo, and to some extent Gray, address is whether bank models are sufficiently developed and comprehensive to be employed in the calculation of risk-sensitive capital requirements on banking book exposures. Both studies are quick to conclude that global use of credit risk models for the entire banking book is quite infeasible at the current stage of development of credit risk modeling. Nevertheless, both studies view the adoption of such models in some form as inevitable. The primary argument advanced by Jones and Mingo is that large U.S. banks currently engage in substantial "capital arbitrage," using securitizations and other transactions to cut their capital levels while retaining the underlying credit risk. A more positive argument, perhaps, is that by allowing the use of models, supervisors may reduce distortions in banks' portfolio choices attributable to the current capital requirement system, with its unsophisticated approach to risk weighting.

There are two ways in which credit risk models could be employed in a limited sense for capital requirement calculations. The first would involve their use as a guide in banking supervision. In their contact with banks, U.S. supervisors suggest capital add-ons for banking book assets over and above the Basle 8 percent capital charge. In the United Kingdom, such add-ons have a more formal status in that regulators actually require banks to hold amounts of capital over and above the Basle 8 percent charge. Thus, U.K. banks are required to maintain risk-asset ratios for each U.K. bank (that is, the ratio of broad capital to risk-weighted assets) that exceed bank-specific trigger ratios. In principle at least, output from credit risk models could be used as an input to decisions about such formal or informal capital add-ons.

Second, credit risk models could be employed for part but not all of the banking book. Jones and Mingo have a limited discussion of this point. The section of the banking book to which models might be applied could be selected either because it is the source of substantial capital arbitrage or possibly because the assets involved have stable credit risk on which considerable information is available. Jones and Mingo presumably have the first of these two criteria in mind when they argue that certain transactions involving securitization should be subjected to modeling. More generally, loans issued by borrowers that already possess ratings on traded debt or that have quoted equity might be obvious candidates for credit risk modeling. Alternatively, some particularly homogeneous asset categories such as mortgages, personal loans, or credit card debt may be judged to have stable default behavior susceptible to credit risk modeling.

CONCLUSION

The papers in the session serve to underline the fact that credit risk modeling will be a crucial area for regulators and industry practitioners in coming years. It is hard to resist the conclusion that models in some shape or form will be used before too long in bank capital calculations. As Jones and Mingo argue, the current division of bank assets between the trading and banking books in and of itself obliges regulators to consider changes since it provides banks with strong incentives to reduce capital requirements through arbitrage. On a more positive note, making bank capital requirements more sensitive to the credit risks a bank faces will reduce distortions inherent in a nonrisk-adjusted system without impairing the main function of capital requirements, that of bolstering the stability of the financial system.