

Credit risk management: a survey of practices

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This paper proposes to investigate the current practices of credit risk management by the largest US-based financial institutions. Owing to the increasing variety in the types of counterparties and the ever-expanding variety in the forms of obligations, credit risk management has jumped to the forefront of risk management activities carried out by firms in the financial services industry. This study is designed to shed light on the current practices of these firms. A short questionnaire, containing seven questions, was mailed to each of the top 100 banking firms headquartered in the USA. It was found that identifying counterparty default risk is the single most-important purpose served by the credit risk models utilized. Close to half of the responding institutions utilize models that are also capable of dealing with counterparty migration risk. Surprisingly, only a minority of banks currently utilize either a proprietary or a vendor-marketed model for the management of their credit risk.

1. Introduction

Shareholder value maximization requires a firm to engage in risk management practices only if doing so enhances the value of the firm and, by implication, its value to shareholders. This value enhancement can arise from one of three sources: (1) minimization of the costs of financial distress, (2) minimization of taxes and (3) minimization of the possibility that the firm may be forced to forego positive NPV projects, because it lacks the internally generated funds to do so (i.e. minimizing the probability of the occurrence of the under-investment problem).

In contrast to the shareholder value maximization, the managerial risk aversion hypothesis (which is based on an agency argument) holds that managers will seek to maximize their own personal well being. This means that managers may, at times, engage in risk management practices at the expense of shareholders. Specifically, when the interests of shareholders are not perfectly aligned with those of the managers, managers may pursue risk management strategies designed to insulate their own personal wealth from the effects of changes in interest rates, commodity prices, or foreign currency values. These steps may be taken without regard for the consequences of these decisions for shareholders' wealth.

It follows, therefore, that regardless of whether shareholder value maximization or managerial risk aversion is the driving force, engagement in risk management practices is to be observed. One of the most important forms of these practices pertains to the management of credit risk, particularly for banks and other firms in the financial services industry ¹.

Credit risk arises from uncertainty in a given counterparty's ability to meet its obligations. The increasing variety in the types of counterparties (from individuals to sovereign governments) and the ever-expanding variety in the forms of obligations (from auto loans to complex derivatives transactions) has

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meant that credit risk management has jumped to the forefront of risk management activities carried out by firms in the financial services industry².

Given this importance, it is surprising to observe that not much is known about the extent by which banks engage in the practice of credit risk management. In recent years, a number of studies have provided the discipline with insights into the practice of risk management within the corporate sector. Fatemi and Glaum (2000) provided a comprehensive picture of the risk management practices of German firms, including interest rate risk management, foreign exchange risk management, the use of derivatives, risk management systems, and the behavioral aspects of risk management. Belk and Glaum (1990); Lessard and Zaheer (1990); Edelshain (1992); Glaum and Roth (1993); Batten et al. (1993) reported on the exchange risk management practices of multinational corporations. Others, such as Bodnar et al. (1995); Bodnar et al. (1996; 1998); Berkman et al. (1997); Grant and Marshall (1997); Howton and Perfect (1998); Bodnar and Gebhardt (1998) have reported on the use of derivative financial instruments by non-financial firms. Yet others, such as Nance et al. (1993); Mian (1996); Jalilvand et al. (1997); Geczy et al. (1997) have investigated the question of the determinants of corporate hedging policies. However, not much has been reported on the state of the art in the practice of credit risk management.

This study is designed to provide some answers in this area. More specifically, we aim to shed light on the question of the state of the art practices of credit risk management by the largest US-based financial institutions.

2. Tools of credit risk management

Prompted by the Bank for International Settlements, and in some cases required by regulatory mandate, banks and other financial institutions have been on the lookout for new means of measuring and managing their credit risk. Adding fuel to the fire has been a series of related events, including: a rapid pace of product innovations, further diversification by financial institutions into new geographical and product market areas, and a stepped up rate of credit intermediation (both in scope and pace). The net effect has been that we have witnessed the development of more sophisticated approaches to the measurement and the management of credit risk exposure. Included among these has been the introduction of the increasingly more sophisticated and complex hedging techniques. More intriguing, and of particular interest (at least for our purposes in this study), has been the development of models that can be used to measure credit migration and default risk at the portfolio level and that can also be used to allocate capital. These can be broadly classified into two types; proprietary (internal) models of credit risk management, and the vendor-marketed models which, in spite of their general-application nature, are almost universally quite elaborate. For clear reasons, not enough information can be obtained about the capabilities of the former category of these models. However, some detail is generally available about the latter category.

This category includes models marketed by Algorithmics, CreditMetrics, CreditRisk+, KMV's Portfolio Manager, Loan Pricing Corporation, and McKinsey's Credit Portfolio View. In what follows, we will briefly describe a few of these models.

Marketed by J.P. Morgan, CreditMetrics was one of the first portfolio models developed for evaluating credit risk. It incorporates a methodology for assessing a portfolio's value at risk (VAR) arising from changes in counterparty credit quality. It establishes an exposure profile of each counterparty, represented within the portfolio, and combines the volatilities of the individual instruments (taking into account correlations between credit events) to model the volatility of the aggregate portfolio. CreditRisk+, marketed by Credit Suisse, is an adaptation of the Credit Suisse Group's methodology for setting loan loss provisions. It is capable of assessing risk capital requirements in an environment where illiquid loans (with little associated data) are held to maturity. Accordingly, its methodology may be more appropriate for firms with retail and institutional loan portfolios, as opposed to those with more bond-oriented compositions.

KMV's Portfolio Manager measures the risk and return characteristics of a portfolio and allows the user to explore the incremental effect of a changing exposure to an individual asset. It also provides for an examination of the effect of a large-scale change to the portfolio mix and, an assessment of potential changes in tactics and strategy. Further, it can be a valuable tool for determining aggregate capital requirements and the allocation of economic capital. Finally, McKinsey's Credit Portfolio View takes into account specific country and industry influences in order to arrive at better estimates of default and credit migration probabilities. It incorporates the evolution of the global macro-economy into country- and

industry-specific speculative default rates. It then maps these rates into cumulative migration probabilities by country and by industry.

As this brief description of some of these models suggests, the increasing complexity of the world of credit risk has given rise to an equally complex set of models designed to measure and manage this risk. This study is designed to provide a picture of the use of such models by the largest US-based banks.

3. The survey and the results

A short questionnaire, containing seven questions, was mailed to each of the top 100 banking firms headquartered in the US. A total of 25 responses were received, of which four were not usable. (Three of the responses had to be excluded because most items were not answered. A fourth one was discarded due to apparent inconsistencies in answers.) The 21 usable responses were from a wide spectrum of banks: those in the top as well those in the bottom deciles by size, international as well as regional banks, publicly traded as well privately-held banks, and diversified as well pure play banks. Therefore, there are no apparent differences between the respondents and nonrespondents. As such, it can be argued that the respondents represent the population of banks surveyed.

Our first question was designed to elicit from the respondents the types of risk their credit risk model is designed to identify. More specifically, we wanted to determine whether the type of model employed by the bank is designed to only estimate portfolio loss arising from default, or it is designed to also deal with migration risk⁵. Table I reports the results. According to these results, 90 per cent of the respondents indicate that identifying counterparty default risk is the single most-important purpose served by their credit risk models. Almost half of the respondents indicate that their models are also capable of dealing with counterparty migration risk. The usage of credit risk models to deal with default and migration risks at the portfolio level is much less frequent, with 38 per cent and 29 per cent indicating such uses, respectively.

Table I. The types of risk the bank's credit risk model is designed to identify

	Frequency of response	Percent of responses
Counterparty default risk	19	90
Counter party migration risk	10	48
Default risk at the portfolio level	8	38
Migration risk at the portfolio level	6	29

We next asked our respondents to indicate whether they use, or plan to use, any of the six vendor-marketed models for either their traded bond portfolios or their non-traded credit loans. The results are summarized in Table II. According to these results, only a minority of banks currently utilize these models for either purpose. Relatively speaking, however, they are more widely used for the management of non-traded credit loan portfolios. Insofar as relative preferences for these vendor-marketed models the are concerned, KMV's Portfolio Manager model edges out CreditMetrics by a small margin.

Table II. Planned or current usage of vendor-marketed models

	Traded bonds		Non-traded credit	
	Planned	Used	Planned	Used
Algorithms		4	2	
CreditMetrics	1	3	4	3
CrediTRisk+		2	2	3
KMV's portfolio manager	1	5	7	4
Loan pricing corporation		1		
McKnisey's credit portfolio view				

Table III provides a tally of the responses to our question regarding the current or planned use of in-house proprietary models. According to these results, again, only a minority of banks utilize, or plan to utilize in-house models of credit risk management. Interestingly, with only one exception, banks that use their own proprietary models of credit risk management are the same ones that also utilize a vendor-marketed model. Therefore, those that do utilize a model of credit risk management, do so both through an in-house model and an outsourced one as well.

Table III. Planned or current usage of proprietary models

	Traded bonds		Non-traded credit	
	Planned	Used	Planned	Used
Internal risk model	1	6	2	9
Risk term, default mode model		3	2	
Risk term, mark-to-market model		2	4	
Default correlation modeling, via asset correlation		2	2	3
Default correlation modeling, via default rate volatility		3	7	4
Technical concept, analytical model		2		
Technical concept, simulation model		2		
Other, please specify				

The usage of models based on correlation modeling via default rate volatility dominates all others. Mark-to-market models are the second most widely utilized type among the proprietary models. Others are not that widely used. Further, it appears that these models are more widely used for non-traded credits, than they are for traded bonds.

We next asked our respondents to indicate what best describes the purpose for which they currently use their credit risk portfolio system: assignment of economic capital for individual transactions, assignment of economic capital for portfolios, or the pricing of individual transactions. The results are reported in Table IV. According to these results, the assignment of economic capital for portfolios is the leading usage of such models. The pricing of individual transactions and the assignment of economic capital for individual transactions rank second and third, respectively.

Table IV. The purpose served by the credit risk portfolio modeling system

	Frequency of response	Percent of responses
Assignment of economic capital for individual transactions	10	45
Assignment of economic capital for portfolios	17	81
Pricing of individual transactions	13	62

We also asked our respondents to indicate whether they currently use a Markowitz-type approach to optimize their credit portfolios. The uniform response was negative.

Finally, we asked our respondents to indicate whether credit risk policy is part of their company-wide capital management policy. The results are reported in Table V. The overwhelming majority indicate that their credit risk policy is part of their company-wide strategy for capital management.

Table V. Is credit risk policy part of the company-wide capital management strategy?

	Frequency of response	Percent of responses
Yes	19	90
No	2	10

4. Concluding remarks

In a survey of the largest financial institutions based in the US, we find that identifying counterparty default risk is the single most-important purpose served by the credit risk models utilized. Close to half of the responding institutions utilize models that are also capable of dealing with counterparty migration risk. Surprisingly, only a minority of banks currently utilize either a proprietary or a vendor-marketed model for the management of their credit risk. Interestingly, those that utilize their own in-house model also utilize a vendor-marketed model. Not surprisingly, such models are more widely used for the management of non-traded credit loan portfolios than they are for the management of traded bonds.

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¹ BIS, for example, maintains that "... the major cause of serious banking problems continues to be directly related to lax credit standards for borrowers and counterparties, poor portfolio risk management, or a lack of attention to changes in economic or other circumstances that can lead to a deterioration in the credit standing of a bank's counterparties." See *Principles for the Management of Credit Risk*, Consultative paper prepared by the Basel Committee on Banking Supervision, July 1999.

² Consider, for example, forwards or swaps. These derivatives usually have a market value of zero when they are first entered into. Given that mark-to-market exposure does not capture the potential for market values to increase over time, effective assessment of the risks involved requires that some probabilistic metric of potential credit exposure be used.

³ Migration risk deals with the possibility that, at some point in the future, the credit rating of an obligor may deteriorate, leading to a diminution in value.