

Response to the Basel Committee's
Consultative Paper on
A New Capital Adequacy Framework

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Basel Committee on Banking Supervision
Bank for International Settlements
CH-4002
Basel, Switzerland

Dear Members of the Basel Committee:

On December 16, RMA provided the Basel Committee with a preliminary response to its June, 1999 Consultative Paper, and stated, "RMA applauds the three-pillar approach outlined in the Consultative Paper," but "strongly opposes restricting implementation to a standardized regulatory capital requirement tied solely to external risk rating agencies as included in the first pillar."

Recent research by the Basel Committee's Models Task Force has shown that institutions use internal risk rating systems in appropriate fashion to make economic capital determinations. RMA believes very strongly that advanced-practice institutions must be allowed to use an internal ratings based approach (IRB) to assign regulatory capital. To do otherwise would retard the significant progress the industry has made over the last decade toward better identification, management, and mitigation of credit risk. It would also compromise greatly the Basel Committee's intent to revise the Accord so that "regulatory capital requirements reflect underlying risks."

In December 1999, RMA formed a Capital Working Group to provide the Basel Committee with an analysis of how institutions use their IRB systems to assign capital. In our first survey we show how economic capital is allocated for a hypothetical asset with a one-year duration, based on two dimensions -- expected default frequency (EDF) and loss given default (LGD) -- for an associated time horizon of one year. The survey results are included in Tables 3 and 4 of our response. A discussion of the underlying assumptions used in the survey is included in Appendix 1.

RMA's research shows that institutions do set economic capital based on numerical measurements of risk derived from their internal risk rating systems. RMA is not recommending a particular IRB system that the regulators should adopt. Rather, we are demonstrating how IRB systems, even though they may differ greatly across banks, can be used to allocate capital for regulatory purposes.

In our December preliminary response, we suggested that an IRB approach should be available for assigning regulatory capital for retail credits as well as commercial credits. Further survey work regarding economic capital allocations for retail credits is in progress and we hope to share the results with the Committee later this year. RMA is

also conducting further research to examine: a) assets with durations greater than one year; and b) economic capital allocation models with greater than one-year horizons.

In addition to capital for credit risk, each respondent in RMA's Capital Group allocates capital for operational risk, and we hope to work with the Committee to demonstrate how these institutions conduct capital calculations for operational risk as well. However, we would strongly oppose any scheme that simply added an operational risk capital charge to the existing credit risk capital charge.

Finally, RMA believes that a rational economic soundness standard must be adopted for regulatory capital if the reform process is to prove meaningful. That is, most large advanced-practice banks use their internal systems to allocate economic capital using a formula for "soundness" that generally consists of an insolvency probability over a particular time horizon. Regulatory capital requirements must be based on a similar formula to ensure that banks are no longer incented to engage in regulatory capital arbitrage.

RMA appreciates greatly the opportunity to provide further commentary on the Consultative Paper released by the Committee last June. We also owe a great debt of gratitude to the participants in the RMA Capital Group who helped to construct the EDF/LGD matrix, contributed the data contained in Tables 3 and 4, and helped draft the RMA response. Some of the banks participating in the RMA group will provide individual responses to the Consultative Paper that may include issues not addressed within the RMA response or which vary from the positions taken by RMA in the response. A list of the institutions and bank staff members who worked on the RMA response is included as Appendix 2 in the response.

RMA will forward additional research data to the Basel Committee as such data become available. We would welcome the opportunity to meet with Basel staff to discuss our findings further.

Sincerely

Allen Sanborn, President & CEO
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Executive Summary

The Basel Committee should be congratulated on its recognition of the shortcomings of the current Accord and its initiation of a process to develop new, truly risk-based iteration(s) of the formal regulatory minimum capital requirements. In addition, the RMA Capital Group applauds the establishment of the principal of the three “pillars” – formal capital regulations, bank-by-bank supervision, and market discipline – to provide prudential oversight of bank risk-taking. We believe that, of the three pillars, the formal capital regulations should be thought of as only a “backstop” to the other two pillars. In particular, market discipline is the most important of the pillars, and we support efforts to improve disclosure to allow market discipline to continue its effective work.

Major comments of the RMA Group.

The RMA Capital Group believes that the Committee should forego establishing the proposed “standardized” approach to the Accord and move instead to an “Internal Ratings Based” (IRB) approach. As soon as is practical, the IRB approach should be followed with a full Internal Models approach to capital. An IRB approach should apply to "advanced practice" institutions that have acceptable internal procedures for measuring the credit risk characteristics of the positions in their portfolios. A significantly revised “standardized” approach should be developed to apply only in the following circumstances:

- a) for less complex institutions using traditional risk measurement and management practices ("traditional practice" or TP institutions),
- b) in countries in which the supervisory regime is not yet up to the task of managing an IRB approach, or
- c) for any portion of a complex, advanced-practice (AP) institution's credit portfolio for which the bank does not yet have a supervisor-approved set of procedures for "bucketing" risk positions for an IRB approach.

Thus, we recommend a “phase-in” of an IRB approach – first, for institutions with robust IRB systems whose supervisors have developed acceptable validation procedures, and

next for smaller institutions or less-advanced banks, or banks within less-advanced supervisory regimes, as such institutions and their supervisors develop acceptable internal "bucketing" procedures.

There are several difficulties with the "external ratings"-based proposal incorporated within the "standardized" approach. Among these:

- There are too few "capital buckets" under the proposed approach, leading to the continued need for Regulatory Capital Arbitrage (RCA).
- The capital allocations in the proposed standardized approach are based on the old Accord's 4 percent Tier 1 and 8 percent Total risk-based-capital ratios and, like the old Accord, are therefore arbitrary.
- The proposed standardized approach does nothing to deal with the one-size-fits-all nature of the current Accord's treatment of retail, non-mortgage credits.

Internal, as opposed to external, ratings are likely to be more accurate, specific (in terms of their usage within internal economic capital models) and more verifiable than external ratings. Additionally, internal ratings, as opposed to external ratings, are applied to the whole of, not just part of, the bank's loan portfolio.

An "Internal Ratings-Based" approach should be formulated to rely on the most important risk characteristics that are currently used within best-practice internal economic capital allocation systems. Such risk characteristics include, but are not limited to:

- expected default frequency (EDF) over a given horizon
- estimated expected loss given default (LGD)
- term to maturity, or duration

We suggest that the Committee begin with an EDF-LGD based IRB system and then add other risk characteristics at later dates. In particular, we believe that an IRB approach should be based on specific, separate, *numerical* internal estimates of EDF and LGD for each asset, rather than on letter or ordinal-number "grades." Indeed, the advanced-practice banks all have established reasonably rigorous methods for estimating EDFs and LGDs for each of their credit-risk positions. Table 2 in the text provides a specific

example of the type of EDF-LGD “matrix” that could be easily developed by regulators. Table 3 shows how the RMA Capital Group participants would allocate economic capital for credit risk to each of the cells within the matrix example. By using numerical ranges of EDFs and LGDs to establish capital requirements, the regulators also avoid the need to develop complicated *concordance* schedules between and among various internal and external ratings processes.

The regulatory capital charges for any given EDF/LGD “risk bucket” should not be set arbitrarily, but should be related to best-practice estimates of economic capital for credit risk. In particular, the regulatory capital charges should be chosen to achieve a particular level of minimum “soundness” for the banks subject to the IRB approach. We recommend that the definition of “soundness” should be “insolvency probability over a one-year horizon” – because this is, in effect, the definition of soundness implied by the internal economic capital allocation systems used by the preponderance of large, global institutions. We recommend, furthermore, that the specific targeted maximum insolvency probability set by regulators should be such that the bank operates at no less than a BBB(-) level of soundness. In insolvency probability terms, this suggests that capital should be set such that there is no more than about a 0.5 percent probability that credit losses will exceed capital over a one-year horizon. In practice, all banks would be expected to hold actual capital that *exceeded* this regulatory minimum (as they now do); thus, banks would be expected to maintain a *higher* soundness standard than BBB(-).

Other issues addressed by the Consultative Paper.

- 1) *Risk mitigation techniques.* In general, the text of the RMA response suggests that the Committee use, wherever possible, the techniques used by best-practice banks when assessing the economic capital implications of risk-mitigation techniques. For example, in the case of a maturity mismatched credit-risk-hedged position, banks generally reduce the capital allocation for the hedged instrument by the amount of capital associated with the hedge instrument. In the case of an exact asset match (but a maturity mismatch), the shorter duration of the hedge instrument would be associated with a lower capital allocation than that of the underlying asset. The (net) economic capital

attached to the hedged position thus would be the difference in capital associated with the (longer duration) underlying and the (shorter duration) hedging instrument.

- 2) *Securitization tranches.* Within an IRB approach, the capital associated with any securitization position – whether ordinary recourse or a credit enhancement on assets originated by others – should reasonably be associated with the (supervisor-certified) internal rating of the credit enhancement position (expressed in EDF-LGD form). And, as in the case of whole loans, the regulatory capital for each such internally-rated position should be based on best-practice estimates of economic capital (set so as to achieve the regulator’s desired minimum soundness – or maximum insolvency probability – standard).
- 3) *Operational Risk.* The RMA capital group does not wish to make a specific recommendation at this time, but would welcome working with Basel on the treatment of operational, and other, risks. We do note, however, that operational risk is not highly correlated with credit risk and, thus, it would be inappropriate to assess capital for operating risk as a simple add-on proportional to the capital allocation for credit risk.

I. Introduction and Overview¹

The Consultative Paper represents a major milestone in the evolution of the prudential regulation and supervision of banking institutions, and RMA welcomes the opportunity to provide commentary. Moreover, the Basel Committee should be praised for its recognition of important emerging issues in the arena of risk management and mitigation and prudential oversight. In particular:

- The Paper recognizes the shortcomings of the current Accord, specifically its "one-size-fits-all" nature and the resulting incentives for the conduct of regulatory capital arbitrage ("RCA").
- It establishes the principle of the three "pillars" of prudential oversight -- formal capital regulation, bank-by-bank supervision, and market discipline.
- It establishes some clear objectives for prudential regulation and supervision -- including enhancing competitive equality and providing for a more comprehensive approach to addressing risks.
- It asks for specific comment on several pressing issues, including the treatment of a) credit risk mitigation techniques, b) securitization tranches, c) risks other than credit risk, and d) the difficulties associated with the artificial accounting distinction between the trading account and the banking book.
- It introduces the possibility of allowing institutions to use their own internal risk rating systems or an Internal Ratings Based (IRB) approach to allocate regulatory capital.

¹ Some of the banks participating in the RMA group will provide individual responses to the Consultative Paper that may include issues not addressed within the RMA response or which vary from the positions taken by RMA in the response.

Notwithstanding these important achievements, the RMA Capital Group disagrees with the Paper's proposed new "standardized" approach to the Accord. We recommend instead that Basel implement an alternative Internal Ratings Based (IRB) approach for complex, advanced-practice banking institutions.² A revised standardized approach might be appropriate, however, in the following circumstances.

- a) for less complex institutions using traditional risk measurement and management practices (which we term "traditional practice" or TP institutions),
- b) in countries in which the supervisory regime is not yet up to the task of managing an IRB approach, or
- c) for any portion of a complex, advanced-practice (AP) institution's credit portfolio for which the bank does not yet have a supervisor-approved set of procedures for "bucketing" risk positions for an IRB approach.³

An IRB approach, moreover, should be structured to naturally evolve, as quickly as practical, into a full internal-models-based approach. Only a models-based approach can hope to fully capture within a prudential standard all of the most important drivers of risk, including the size and specific construction (diversification) of the bank's credit portfolio.

The RMA Group fully recognizes and appreciates the regulators' view that a full models-based approach is problematic so long as there are concerns with model validation. Indeed, we agree that advanced-practice banks could do a significantly better job of validating model parameters, conducting sensitivity tests, and conducting back-testing and stress-testing of models' results. However, we believe that the concept of estimating "economic capital" for credit and other risks is the only widely-accepted framework in which to assess the adequacy of a bank's capital. No AP bank of which we

² By "Internal Ratings Based" we mean a multi-dimensional "bucketing" of risk positions according to measurable risk characteristics such as expected default frequency, estimated loss-given-default, etc.

³ Indeed, the RMA Group believes that "bifurcation" of the regulatory/supervisory system -- a different set of rules and supervisory techniques for large, complex AP banks versus TP, generally smaller institutions -- may be necessary over the intermediate term in order to reach a rational prudential oversight system. Nor is it necessarily the case that such a bifurcation would disadvantage smaller institutions. Rather, because of systemic risk concerns, it is important that larger, AP banks be rationally supervised in ways that reduce or eliminate the need to engage in RCA. Less oversight and concern over RCA activities of the traditional-practice institutions is warranted; thus, such banks should find capital regulation and supervision less binding than would large, complex institutions.

are aware would determine the adequacy of its capital *solely* by using its risk models -- a great deal of judgment is also involved. However, the concept of economic capital models is playing an increasingly important role in bank capital decisions and in pricing and other business decisions. Moreover, some AP banks and bank-consulting firms have developed fairly rigorous procedures for parameter validation and, as such, these best-practice models provide a firm foundation on which to rest concepts of capital adequacy. Thus, we believe that the use of such models should be incorporated sooner rather than later into the regulatory capital process -- especially where the models would help determine *minimum* capital requirements for an advanced-practice institution.

The RMA Group's major concern with the proposed "standardized" approach is that the old, arbitrary risk weights are replaced with a series of new requirements that also fail to tie capital to risk in a meaningful way. An essential problem is that neither the old Accord nor the new, proposed standardized approach is grounded in a well-defined and quantifiable objective for prudential regulation that identifies a "soundness" level that banks must maintain. The Paper says simply that a primary objective of regulation is to "promote safety and soundness in the financial system." But such an objective is defined far too vaguely to provide a basis for determining whether or not any particular new Accord will help meet such an objective. The proposed standardized approach essentially starts from an arbitrary base in which 8 percent total risk-based capital is required for a "typical" bank asset, then ratchets this requirement up or down depending on whether the position in question is perceived to be more or less risky than a "typical" position.

Contrast this approach with the approach taken within the economic capital measurement processes of the large AP banks around the world. Within many *internal* bank processes, "soundness" has a specific meaning and a specific targeted level. At virtually all large AP banks, soundness is meant to be an analogue to "insolvency probability over a particular time horizon." In the vast majority of such banks, the time horizon is set at one year and the targeted insolvency probability is set at 0.5 percent or lower. That is, economic capital is defined as the amount of capital that would reduce to 0.5 percent or lower the probability that, over a one-year horizon, losses would exceed

that level of capital. Indeed, regulatory capital arbitrage exists -- and will continue to exist -- whenever, for a particular class of assets, the Basel capital requirement significantly exceeds the bank's best-practice estimate of economic capital (calculated at the bank's targeted insolvency probability level).

Absent further guidance by Basel on the proper level of insolvency probability, or some other quantifiable definition of soundness, future iterations of the Accord will continue to be based on vague notions of soundness. Regulators will say that "more is better" and bankers, who base their asset-pricing and portfolio management decisions on precise definitions of soundness, will be frustrated at the seemingly arbitrary nature of capital regulations. Faced with inappropriately high capital requirements for selected risk positions, bankers must engage in RCA. But such arbitrage is costly and, thus, in order to continue to meet its own, specific internal soundness standard, the bank will be unable to maximize the shareholder-value-added of its risk-taking activities. Meanwhile, the existence of RCA will continue to frustrate supervisors and lead to inaccurate, if not misleading, regulatory capital ratios that may bear little relationship to the true insolvency probability of the bank.

Some members of the regulatory establishment, moreover, argue that the problem can be solved by continuing with relatively arbitrary capital regulations while simply penalizing or "outlawing" regulatory capital arbitrage. In this view, all RCA is socially undesirable, or "bad." The RMA Group, instead, takes the views espoused by Chairman Greenspan:

"Regulatory capital arbitrage, I should emphasize, is not necessarily undesirable. In many cases, regulatory capital arbitrage acts as a safety-valve for attenuating the adverse effects of those regulatory capital requirements that are well in excess of the levels warranted by a specific activity's underlying economic risk. Absent such arbitrage, a regulatory capital requirement that is inappropriately high for the economic risk of a particular activity could cause a bank to exit that relatively low-risk business, by preventing the bank from earning an acceptable rate of return on its capital. That is, arbitrage may appropriately lower the effective capital requirements against some *safe* (emphasis added)

activities that banks would otherwise be forced to drop by the effects of regulation."⁴

Moreover, Chairman Greenspan has often stated the view that banks perform a valuable social service by accepting, pricing, and managing various forms of risk, including credit risk. Overly high implicit regulatory soundness standards can negate this value to the macro-economy:

"First, a reasonable principle for setting regulatory soundness standards is to act much as the market would if there were no safety net and all market participants were fully informed. For example, requiring all of our regulated financial institutions to maintain insolvency probabilities that are equivalent to a triple-A rating standard would be demonstrably too stringent, because there are very few such entities among *unregulated* financial institutions *not* subject to the safety net. That is, the markets are telling us that the value of the financial firm is not, in general, maximized at default probabilities reflected in triple-A ratings. This suggests, in turn, that regulated financial intermediaries can not maximize their value to the overall economy if they are forced to operate at unreasonably high soundness levels."⁵

The RMA Capital Group agrees wholeheartedly with this view, and in Section III below we suggest a particular, quantifiable regulatory soundness standard that, we believe, is neither too high nor too low.

The RMA Group also applauds the Consultative Paper's establishment of the three "pillars" of prudential oversight -- capital regulations, bank-by-bank supervision, and market discipline. In our view, the regulatory pillar should always be thought of as the least "thick" of the three pillars, acting primarily as a last resort if the other two fail. We believe that the market place is the *best* arbiter of capital adequacy at a large, complex banking organization. In this regard, we support efforts to improve *disclosure* of information necessary to make informed judgements concerning the riskiness of an institution's activities and the adequacy of its capital held against such risk. We also

⁴ See "The Role of Capital in Optimal Banking Supervision and Regulation," Remarks by Alan Greenspan before the Conference on Capital Regulation in the 21st Century, Federal Reserve Bank of New York, February 26, 1998.

support ongoing banking agency efforts to analyze the efficacy of proposals regarding the use of subordinate debt to assist in agencies' determination of capital adequacy. Of course, the *details* of any specific proposal are critical to analyzing its likely success at achieving the objective of helping to measure soundness while minimizing costs to the banking industry.

The second pillar -- bank-by-bank supervision -- we consider to be more effective than standardized capital regulations. This is because the measurement of risks, especially credit risk, is a complex subject. Appropriate capital standards will necessarily vary from bank to bank, depending on several factors, including but not limited to a) internal processes for identifying and working out troubled assets, b) the quality of internal risk controls (which are at least as important as capital as a defense against possible losses), and c) the specific size and diversification of the portfolio in question. Thus, theoretically correct capital allocations for a particular asset -- even when the same asset is held by two or more banks via participation -- will differ institution to institution. That is why bank-by-bank supervision, in countries that have meaningful supervisory processes, is likely to achieve reasonably-defined safety and soundness objectives with far greater success than can a regulation, no matter how complex, that applies equally to all banks, no matter how diverse.

The natural complexity of "best-practice" economic capital measurement is also why a "bifurcation" of capital regulations along several dimensions may be necessary. In particular, we are concerned that, unless some differentiation in capital rules takes place over the next several iterations of the Accord, the need for and cost of regulatory capital arbitrage may still be substantial. Indeed, from both a regulatory perspective and a shareholder-value-added perspective, the process of crafting the next Accord(s) can be viewed as a quest to reduce significantly, if not eliminate, the need for such arbitrage (by eliminating the disparity between regulatory capital minimums and best-practice economic capital estimates).

Currently, there is a wide diversity across supervisory regimes within the G-10 countries in terms of resources and operating authority of the various supervisory

⁵ Ibid, p. 8.

agencies. Similarly, there is a wide diversity across the banks within any one country regarding their abilities to participate in an IRB approach. These differences are not likely to disappear in the near term, no matter the specific IRB approach chosen. Thus, rather than craft a single new Accord that accommodates all supervisory regimes and all banks in all regimes, we suggest a more "phased-in" approach. First, an IRB approach could be implemented for those large AP banks in those G-10 countries that are now ready, or soon will be ready, to certify (or de-certify) the internal risk measurement procedures of the large banks (their ability, for example, to estimate a position's expected-default-frequency). Second, within a G-10 country that has certification procedures, an IRB approach for advanced-practice banks could co-exist with a revised standardized approach for other, traditional-practice banks. Other G-10 countries could proceed with a revised standardized approach until the banks and supervisors in these countries too are ready for an IRB approach.

It is also possible to phase-in the degree of complexity of the internal risk-bucketing procedures that would be called for by any particular IRB approach. For example, suppose a particular AP bank uses supervisory-certified procedures for estimating probability of default or loss-given-default (see discussion in Section III below) within its commercial loan portfolio, but not elsewhere in the bank. Such a bank could be subject to an IRB approach for commercial loans but a standardized approach for non-commercial-loans. This sort of rules-differentiation is not qualitatively different from bifurcation by country (in terms of each country's implementation of the current Accord) or by bank size and complexity (in terms of which banks are or are not subject to an IRB approach). The important point is that, if a particular bank in a particular supervisory regime is truly a best-practice institution (and certified as such), then it should not be burdened by the costs of having to engage in regulatory arbitrage while waiting for other regulated banks in other regimes to "catch up." After all, every bank, whether best-practice or not, must compete with non-regulated financial institutions that are both best-practice and not subject to regulatory capital rules on a consolidated basis. By phasing-in a truly risk-based Accord according to the particular phase of development

of supervisory and bank practices, we provide the greatest incentive for all banks and all supervisory regimes to reach and maintain best-practice.

In the sections that follow we have structured our response to deal first with the proposed standardized approach (Section II), then a proposed IRB approach (Section III). We follow in Section IV with a discussion of the treatment of risk mitigation techniques, as per the Consultative Paper. We do not wish to comment on interest-rate risk within the banking book at this time, and we comment only briefly on operational risk in Section V.

Finally, it should be noted that the scope of this response to Basel is focussed mainly on certain aspects of credit risk. While, in our view, credit risk is a predominate risk, *country risk* assessment is integral to the process of crafting capital allocations that are truly sensitive to the underlying elements of risk within a bank's portfolio. The RMA respondents participating in this exercise tend to treat country risk in one of three ways -- a) not at all, if cross-border exposures are not important within the portfolio; b) as a subset of credit risk (i.e., as a "sovereign cap" in the bank's internal credit ratings); or c) as a risk independent of credit risk, treated as a separate capital "add-on." Within this latter category, complex approaches are often used to derive economic capital add-ons, which reflect additional risks that may pertain to lending in foreign countries and which are outside the control of any particular obligor. The RMA group would be pleased to provide additional analysis of country risk capital charges at a later date.

II. The Proposed New "Standardized" Approach.

The proposed new approach would make substantial use of external "ratings" of bank counterparties in which, for the first time within the banking book, the external ratings would be used as the basis for regulatory capital assessments. The following table summarizes how the Consultative Paper suggests that capital be allocated according to rating. The capital allocations in the table are expressed in terms of "risk-weights" (i.e., percentages of the standard 4% Tier 1 and 8% Total risk-based capital requirement).

Table 1

Claims		Assessment					
		AAA to AA-	A+ to A-	BBB+ to BBB-	BB+ to B-	Below B-	Unrated
Sovereigns		0%	20%	50%	100%	150%	100%
Banks	Option 1 ¹	20%	50%	100%	100%	150%	100%
	Option 2 ²	20%	50% ³	50% ³	100% ³	150%	50% ³
Corporates		20%	100%	100%	100%	150%	100%

¹ Risk weighting based on risk weighting of sovereign in which the bank is incorporated.

² Risk weighting based on the assessment of the individual bank.

³ Claims on banks of a short original maturity, for example less than six months, would receive a weighting that is one category more favourable than the usual risk weight on the bank's claims.

Difficulties with the proposed external ratings approach.

The RMA Group has several significant concerns over the use of external ratings to set capital requirements in the fashion expressed within Table 1.

- a) Only a relatively small portion of an institution's balance sheet contains assets that have external ratings. Thus, the attempt to make the Accord more "risk-sensitive" would leave large portions of the commercial loan portfolio subject to the current Accord's one-size-fits-all nature. Even if the Paper's proposal were altered to include non-rated assets on which the obligor issues *some* liability (not that held by the bank) that is rated, the problem would not be significantly assuaged. That is, a substantial portion of the commercial loan portfolio of banks consists of obligors that issue no publicly-rated securities.
- b) A significant portion of an AP bank's portfolio consists of obligors that issue no publicly rated paper, yet whose risk is equivalent to AAA or AA debt. Under the

proposed standardized approach, banks would be penalized by lending to such high quality, but not publicly rated, customers.

- c) The external rating process itself presents significant difficulties, many of which would be attenuated by using *internal* instead of external ratings (or more precisely, internally-generated estimates of default probability and loss-given-default).
- In order to increase objectivity, many AP banks have begun incorporating into their internal rating procedures formal credit scoring or equity-based processes to estimate expected default frequencies. Similarly, some banks have begun basing loss-given-default ("LGD") estimates on internal and external historical LGD databases. We do not wish to characterize these attempts at risk parameter estimation (and parameter validation) as being fully "mature," but we do believe that a significant level of rigor applies (especially in the validation of default-probability estimates).
 - The public rating agencies, as a generality, do not know the terms of the loan *facility*. Therefore, although the agencies may rate the *obligor*, they generally cannot rate the facility. An exception is the universe of traded, rated commercial loans that are tracked by one or more of the agencies.
 - The significant differences in process, and in underlying databases, across the public rating agencies, especially between countries, presents a problem of *acceptability* (which is recognized within the Consultative Paper). It is much easier and more germane, we believe, for each country's banking supervisors to assess the quality of banks' *internal* ratings procedures than to assess the quality of each country's public rating agencies (due in part to the matter of access to what is essentially a non-regulated rating industry).
 - The issue of comparability across external ratings is also raised in the Paper. The RMA Group's view is that the best basis on which to gauge comparability is in terms of the rating's equivalent estimated expected default frequency ("EDF")⁶, otherwise known as probability of default ("PD"). But why use the rating as a *proxy* for EDF when AP institutions have in place a process for estimating the EDF of an asset in specific, *numerical* terms?

- d) Any rating-based system, whether based on external or internal ratings, is one-dimensional -- the rating determines the capital allocation. Best-practice research, however, indicates that the determination of appropriate economic capital rests on a number of very important risk indicators; i.e., the determination of economic capital is *multi-dimensional*. We argue in Section III below that, at a minimum, the determination of capital should be two-dimensional -- based on estimates of an asset's EDF as well as its LGD. Still other dimensions of risk measurement are important but reasonably might be added at a later iteration of a new Accord. Of course, some ratings agencies state that their ratings can be thought of as an expression of a range of expected loss rates ("EL"), which is the result of multiplying EDF by LGD. However, the RMA Group believes that EL should be deconstructed into its components in order to avoid lumping assets with dissimilar risk characteristics into the same capital slot. [See discussion in Section III.]
- e) We see no reason to treat the obligations of sovereigns differently from that of banks which, in turn, are treated differently from that of non-bank corporates -- except insofar as the type of obligor affects internal estimates of risk characteristics (such as EDF or LGD). Once such risk characteristics are ascertained, these risk factors should drive capital allocations, not whether the obligor is a sovereign, bank, or corporate entity. At best, such differences lead to inappropriate allocation of scarce credit resources; at worst, they give rise to additional incentives for RCA.
- f) In addition to the difficulties expressed above, the "standardized" proposal suffers from two additional and, in our view, fatal shortcomings:
- There are still too few capital buckets to reduce the need for regulatory capital arbitrage. That is, the capital buckets lack granularity. The original Accord calls for only 4 capital buckets or risk weights -- 0%, 20% (total RBC of 1.6%), 50% (total RBC of 4.0%), and 100% (total RBC of 8.0%). The standardized proposal simply adds one more capital-bucket (a risk-weight of 150%) and then reassigns some assets from their original bucket to a new

⁶ In this paper, "EDF" refers to an expected default frequency estimated using any number of different estimation procedures. "EDF™" refers to an EDF estimated using KMV's proprietary equity-based method.

bucket. For example, AA/AAA rated corporates are reassigned from the 100% risk-weight bucket to the 20% risk-weight bucket.

Contrast these (now 5) risk-buckets with the very fine gradations of economic capital made within the best-practice procedures of many global banks. It is not unusual, for example, for a commercial loan to be assigned economic capital of 10 or 20 *basis points* (i.e., less than a 5 percent regulatory risk-weight, in terms of Tier 1 capital, and less than a 2.5 percent risk-weight in terms of Total risk-based capital). Nor is it unusual for a best-practice bank to assign more than 20 or 30 *percentage points* for economic capital for assets with very high estimated EDFs and high estimated LGDs. [See the survey results in Section III.] Moreover, as our survey results show, AP banks typically assign economic capital over more or less a continuum, not in the large *jumps* associated with the current Accord or the proposed standardized revision. Thus, within the proposed standardized version of the Accord there are substantial "gaps" that constitute continued incentive to engage in regulatory capital arbitrage.

- The capital requirements of the proposed new standardized version remain subjective. That is, the cells in Table 1 (with the exception of the added new 150% risk-weight column) relate solely to the existing, arbitrary 0%, 1.6%, 4.0%, 8.0% (total RBC) regulatory requirements. As shown in Section III below, most best-practice institutions would assign positive economic capital to a loan to a sovereign but would assign much less than 1.6 percent economic capital to a AAA/AA loan to a non-bank corporation. Conversely, for some assets in the all-in-one-category of "below B-" most banks would assign more than 12% economic capital. The proposed capital allocations in Table 1, therefore, represent little improvement over the current Accord.

The preceding discussion pertains mainly to the discussion within the Consultative Paper dealing with commercial loans and bonds, including loans to sovereigns, banks, and non-bank corporations. Below, we discuss the other types of credit positions, both on-balance-sheet and off, as per the Paper, as well as the other

important issues raised with respect to the "standardized" proposal. The discussion appears roughly in the order the topics appear in the Consultative Paper.

1. Commercial real estate and retail loans. In general, the standardized proposal retains the current Accord's treatment of on-balance-sheet credits in this broad category. Like the treatment of commercial loans, therefore, the assigned regulatory capital requirements are subjective. The RMA Group has provided empirically based and theoretically sound capital allocations (see Appendix) for commercial loans (and commercial real estate credits), and we are in the process of developing a similar survey for economic capital for credits on the retail side. As in the case of commercial loans, the key to assigning rational capital requirements to retail credits is to meaningfully distinguish among degrees of risk -- rather than continue to lump all retail credits (except for residential mortgages) into the same 8 percent capital bucket.

While we have not yet completed this new survey work in the retail area, we believe that it may be possible to make meaningful risk distinctions by defining product categories more narrowly. That is, appropriate capital allocations may be achieved by breaking the large category of "non-mortgage retail lending" into several risk categories based on some acceptable definitions. For example, bank cards as a group can be distinguished from unsecured consumer credit lines; similarly, A-rated residential mortgage "paper" can be distinguished from sub-prime paper. The RMA Group hopes to enter into a fruitful dialogue with the Basel Committee on this subject. In general, our preference would be that the "bucketing" of retail credits into meaningfully different risk categories be conducted by each bank, subject to a supervisory oversight process that would approve or disapprove of the bank's bucketing processes. In effect, treatment of capital on the retail side would be similar to that of commercial credits, after taking into account significant differences in loss correlations. That is, retail credits, for a given EDF and LGD, should have lower capital allocations than commercial credits -- because retail credits generally exhibit lower default correlations than commercial credits. Such an internal bucketing procedure, subject to supervisory certification, is far superior, in our view, to an Accord that defines risk-buckets in a way that does not comport with best-practice

methods of estimating economic capital, then applies these definitions to all banks, no matter the details of each bank's internal risk measurement and management processes.

2. Commitments. The RMA Group generally agrees with the position in the Consultative Paper that, in general, loan-equivalent-amounts (LEQs) for short-term unfunded commitments should not be zero. In general, each commitment, no matter the term, should have associated with it an estimate of the amount of drawdown if the obligor defaults. This exposure-at-default (EAD), or equivalently LEQ, is estimated for each facility by the advanced-practice banks.⁷ In an IRB system it would be preferable, we believe, for individual banks to continue to estimate these EADs using historical databases and rigorous methods. Under our proposed internal-ratings-based approach, an AP bank would receive prior approval from its supervisor regarding its "bucketing" procedures -- which would be broadly described as its procedures for estimating EDF, LGD, and EAD for each position. Once an asset is bucketed in these dimensions -- EDF, LGD, EAD -- a common set of capital requirements would apply. Note that capital for EDF/LGD assessments would need to be stated in EDF and LGD *ranges*; i.e., in matrix form as suggested in our Appendix. The estimated EAD (or LEQ) is, however, multiplicative. That is, regulatory capital in each cell of the EDF/LGD matrix might be set for a drawn term loan, while capital for undrawn portions of commitments might be set equal to some proportion of the undrawn commitment. For example, suppose that, under a best-practice method, the bank estimated that exposure-at-default is likely to be 70 percent of the line. Then, if current usage is 20 percent of the line, the LEQ for the undrawn portion would be set at 50 percent of the entire line or, equivalently, 62.5 percent of the undrawn portion.

We believe that EAD (LEQ) estimates are best made via approved internal processes. However, we would not object to the use of a 20 percent LEQ, as proposed by the Consultative Paper, against undrawn short term lines -- presuming

⁷ Generally, LEQ refers to an estimate of the amount of the unfunded portion of the facility that, in addition to the currently drawn portion, would be drawn down at default. EAD generally refers to the absolute amount of the draw-down at default.

that such a rule would be part of a revised standardized approach applicable only to TP banks or to AP banks with non-approved methods for estimating LEQs.⁸

3. Term to Maturity. The RMA Group agrees that term to maturity of a credit position (or, in some economic capital systems, duration) is important in determining economic capital allocations. [See discussion under Section III.]
4. Asset securitization. We agree that the area of securitization (and synthetic securitization) represents a problem area for regulators and banks. Securitization occurs for many reasons, including but certainly not limited to, the desire to engage in regulatory capital arbitrage where the regulatory capital allocations are simply too high. Not only do securitization capital rules represent an RCA opportunity, the current capital rules are inconsistent (across types of securitization) and (again) they are subjective. To cite two such inconsistencies:
 - Assets sold with recourse (for securitizations in which the asset is originated on the books of the bank) are treated significantly differently than assets remotely originated and on which the bank provides credit enhancement ("direct credit substitutes").
 - Indirect credit enhancements exist with respect to several types of securitizations against which no current capital charges apply.

The proposal contained within the Consultative Paper chooses to address these problems only with respect to those credit enhancement positions that are, or could be, externally rated (such as traded subordinated tranches). As such, this proposal does represent an improvement over the current Accord (with one very significant exception discussed below). However, the Consultative Paper proposal goes on to say that securitization tranches rated (externally) B+ or below, or unrated, would be deducted from capital. In other words, such positions would receive a 100% capital charge. What is unclear in the Consultative Paper is whether "unrated" refers narrowly to "securitization tranches" (i.e., securities issued by the Special Purpose Vehicle or SPV) or broadly to all unrated credit enhancements. If the latter, then the proposal is especially onerous, since a 100% capital charge against a B-rated

⁸ Within a standardized approach, liquidity lines for commercial paper facilities might merit a lower than 20

credit position is out of all proportion to best-practice capital allocation (see Section III and the Appendix). Moreover, for many types of securitization, the proposed standard approach's capital charges in the aggregate (for all of a transaction's tranches) would sum to much more than the current Accord's capital requirement for the on-balance-sheet positions.

To risk sounding repetitious, regulatory capital requirements should be logical and consistent across various types of credit positions -- they should be set neither too high nor too low. In the spirit of striving for such rationality, we offer the following. First, it seems quite practical to suggest that regulatory capital requirements for credit enhancements -- whether traded and rated or not -- can be set according to best-practice *internal ratings* of those positions, much as capital for on-balance-sheet loans. *If* the bank has an acceptable procedure for rating the position (estimating its EDF and its LGD) then capital can reasonably be assessed according to that rating process.

Second, we do not see the logic of continuing the disparate treatment between credit enhancements in the form of recourse and non-recourse credit enhancements. What difference does it make if the underlying securitized assets are originated initially on the books of the bank sponsoring the securitization facility or on the books of another bank? Credit enhancements *of all types* should be subject to the internal rating method (again, only for *approved* internal rating processes).

Third, the Paper states that revolving credit securitization programs may pose a particular problem in cases in which master trust agreements contain clauses calling for early amortization of investors' interests. We agree that such early amortization clauses -- which, for example, exist in most credit card securitization arrangements -- often constitute an indirect credit enhancement that reduces substantially the credit risk transferred to the off-balance-sheet investors. Indeed, most best-practice banks estimate economic capital for credit card securitizations *as if* the securitized card receivables had remained on the books of the sponsoring bank.

Unfortunately, both the current Accord and the Consultative Paper's proposed new treatment of such revolving credit facilities are at odds with best-practice estimates of economic capital for credit risk associated with such assets. Consider, for example, the case in which a bank holds a portfolio of credit card receivables, for which it estimates the required economic capital to be 2%, but which currently attracts 8% regulatory capital. The bank could achieve the "correct" results by securitizing the portfolio but retaining a "seller's interest" in the underlying credit card receivables of 25 percent (with the "investors' interest," or off-balance-sheet portion, at 75 percent). Under the current Accord, the total capital requirement for such a position would be 8 percent against the 25 percent seller's interest and 0 percent against the investors' interest -- or a total capital requirement of 2 percent against the underlying assets.

If Basel were to retain the current system but simply add on the requirement that the investors' interest attract an additional 1.6 percent capital, one could reasonably conclude that a major impact of such a requirement would be to force banks to restructure their trust agreements so as to reduce the seller's interest relative to the investors' (off-balance-sheet) interest. There is a limit, however, to the degree to which the seller's interest can be lowered (other things equal, such a decline increases the risk associated with the investors' interest). In the preceding example, the seller's interest would have to be lowered to 6.25 percent in order to achieve an overall 2 percent regulatory capital requirement against the entire underlying card receivables. Such a low seller's interest is not achievable in practical fashion.

Thus, the Consultative Paper's response to the practice of providing early amortization features within revolving credit securitization facilities is a classic case of the regulator viewing all regulatory capital arbitrage as "bad." In fact, the original 8 percent capital requirement against credit card receivables was, and is, well above best-practice economic capital estimates (even at the very high "soundness level" targets used within most large banks' internal economic capital measurement systems). The proposed treatment in the Consultative Paper would serve to install a regulatory capital requirement for the revolving credit receivables that, once again, is

in excess of best-practice estimated economic capital. The RMA Capital Group, in contrast, would advocate that the regulatory capital requirements for *all* retail credits - - whether securitized or not -- be reexamined in the context of an IRB approach to capital. We hope to provide the Committee with additional survey results for retail products in the near future.

5. Criteria for eligible external credit assessment institutions. We agree in principle with the 7 criteria discussed within the Consultative Paper. That is, external rating agencies should be able to demonstrate objectivity, independence, transparency, credibility, international access, sufficient resources, and be recognized by each nation's supervisory authorities. Objectivity, in our view, is the most important of these criteria, and we would agree that objectivity is best demonstrated by showing that the assessment methodology is rigorous (which includes a back-testing requirement). As discussed earlier, however, we believe it is far preferable to make the next iteration of the Accord an *internal*-ratings-based process, founded on proper inspection of internal rating processes by each AP bank's supervisors.

III. An Internal-Ratings-Based (IRB) Approach to Regulatory Capital Requirements

The Committee is to be praised for its expressed intent to seriously study the introduction of an IRB approach to capital regulation. The RMA Capital Group, whose members presently consist of risk measurement and management practitioners at very large banking institutions, are quite comfortable with such an approach and believe that it offers the greatest short-term prospect for rationalization of the Accord for large, complex banking organizations. Such rationalization, we believe, can accomplish all of the major goals of prudential regulation while reducing the need for (and the cost of) regulatory capital arbitrage. Of course, as we have stated earlier, a *risk-models* approach is the desired end-point for a truly rational Accord, and we hope to work closely with the Committee to devise such an approach as soon as is practical.

In assessing the pros and cons of an IRB approach, the Consultative Paper states that "comparability across institutions and countries presents an important hurdle." We

believe that this hurdle is not difficult to overcome. To be sure, practices for assigning "ratings" to assets differ widely across countries and across any one country's large banks. Moreover, "letter grades" assigned by public rating agencies often differ as to their meaning, just as "numerical grades" used in internal bank rating systems often mean different things to different banks. Thus, the Committee's Consultative Paper and a recent Basle paper on internal ratings systems express concern over the difficulties associated with achieving "concordance" of such ratings systems (whether external or internal). However, we believe that a properly constructed IRB approach need not use "ratings" at all but rather could be based on the bucketing of credit risk positions according to numerical estimates of key risk characteristics of each credit.

Specifically, we believe that those banks that would naturally become eligible for an "IRB" approach should have in place an internal process for estimating economic capital for credit risk. After all, regulatory capital arbitrage is defined as structuring a risk position so as to reduce its associated regulatory capital requirement relative to its economic capital requirement. Thus, the Basel Committee's concern regarding RCA -- as well as the concern the best-practice banks have regarding the *cost* of RCA necessitated by subjective capital requirements -- flows from the divergence between regulatory capital calculations and the economic capital estimation process used by a bank for risk management purposes. Therefore, it seems reasonable to base an IRB process, for those banks that would qualify for such an approach, on those measurable risk characteristics that are most important in determining economic capital. The RMA Group believes that among the most important such risk characteristics within economic capital models are the following:

- The position's estimated exposure-at-default (EAD or, equivalently, its loan-equivalent-exposure, LEQ).
- The position's estimated expected default frequency (EDF or, equivalently, its probability of default, PD).
- The position's estimated loss-in-the-event-of-default (LIED) or, equivalently, its loss-given-default (LGD).
- The term to maturity (or duration) of the position.

- The estimated volatility of the LGD estimate. That is, how likely is it that the *expected* LGD will be greatly exceeded if, in fact, the asset does default?
- The degree of default correlation between the asset and every other asset in the bank's portfolio. Diversified portfolios exhibit lower default correlations, thus have less risk, and therefore require less economic capital.

Other informational inputs are also important, depending on the particular economic capital model being used by the bank. However, in our view, any new iteration of the Accord in which some sort of "bucketing" system is retained (as opposed to a models approach) should contain provision for bucketing assets according to one or more of these important risk characteristics listed above.

We would be the first to point out that the last listed risk characteristic -- the asset's estimated default correlation with other assets in the portfolio -- while extremely critical, is difficult to estimate. Indeed, the inclusion of default (loss) correlation estimates, in our view, is what distinguishes a "models-based" approach from a "bucketing" approach (such as an IRB approach). Thus, we believe that a practical yet robust "IRB" approach should bucket assets according to some sub-set of the first 5 risk characteristics listed above.

All of the members of the RMA Capital Group currently are able to make reasonably rigorous *numerical* estimates of the first three risk characteristics -- EAD, EDF, and LGD -- for *each* of their commercial loans and commercial real estate loans. And all would agree that these first three characteristics are among the most important in determining appropriate economic capital. Estimates for EAD, EDF, and LGD can also be made for retail products, on a product basis in all cases and on an asset by asset basis in some cases. In addition, some members of the group routinely make effective duration estimates for each commercial loan (and factor such estimates into their economic capital estimates). Some members also make estimates of LGD volatility for each commercial loan.

Clearly, the "common denominators" among best practitioners are the EDF, LGD, and EAD estimates made by each bank. Therefore, we propose an IRB approach in which each qualifying institution is required first to make an EAD estimate for each

position, then slot the position into one of many "cells" within a numerical EDF/LGD matrix. This "asset-risk-bucketing" matrix should be constructed in a fashion that results in significant changes to the implied economic capital level either as one moves *down* a column within the matrix or *across* a row of the matrix. To provide an example of how such a risk-bucketing scheme would work, we provide the following EDF/LGD matrix.

Table 2

EDF Ranges ↓	LGD Ranges									
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
0-0.04%										
0.04-0.08%										
0.08-0.16%										
0.16-0.32%										
0.32-0.64%										
0.64-1.28%										
1.28-2.56%										
2.56-5.12%										
5.12-10.00%										
>10% but not default										
Default										

Under our proposed approach, each qualifying bank would use an approved internal procedure for estimating each risk position's absolute EAD, its numerical EDF (as a percent, 0 to 100%) and its numerical LGD (as a percent). Table 2 shows a simple scheme in which the EDF ranges double in each "grade" up to the 10.00 percent EDF level. We chose to show this particular set of EDF ranges because it turns out that internally estimated *economic capital* significantly increases as one proceeds down the

EDF column by roughly doubling the EDF range (see Table 3 below). LGDs are broken into 10 equally-sized ranges in arbitrary fashion, but any smaller or larger number of LGD ranges is possible. In fact, of the 11 institutions participating in the RMA Capital Group, the majority used internally 5 to 8 LGD ranges, depending on facility characteristics such as secured/unsecured, the nature of the collateral, and the degree of subordination.

Under our proposal, it would be up to the regulators to fill in the blanks within each of the cells in an EDF/LGD matrix such as Table 2, by dictating the regulatory capital requirement for any asset that is slotted into a particular EDF/LGD cell. This regulatory capital requirement would be expressed as a percentage of the asset's estimated EAD value. In addition, supervisory staffs within each of the G-10 countries would be responsible for certifying that the internal processes used by each bank -- for the estimation of EADs, EDFs, and LGDs -- were acceptable.

Essentially, this certification process would be required under *any* "ratings" based capital scheme. That is, even if regulatory capital allocations were based on letter "grades", each supervisory agency would be responsible for assuring the robustness of the letter grades assigned to each asset. In our view, the best-practice method for certifying the acceptability of such grades is to review the bank's specific process for estimating *numerical* EDFs and LGDs. Non-numerical-based grading systems -- that is, systems that have no counterpart with respect to EDF ranges and/or LGD ranges -- are likely, in our view, to be too subjective in nature to serve as the basis for an economic capital (or regulatory capital) allocation system. And, of course, by eliminating the letter grades and moving directly to a numerically based EDF/LGD system, the regulator does not have to devise complex concordance schedules between and among the internal (or external) letter grades of many banks (and/or rating agencies).

The type of EDF/LGD matrix described in Table 2 may look complex and thus may raise concern over the "principle" raised in the Consultative Paper that there is an important tradeoff between accuracy and simplicity. We respectfully disagree with the notion that this tradeoff is important. The current Accord is extremely complex, yet ineffective. Any Accord that actually matches capital allocations to relative degrees of risk will be complex, because the measurement of risk is itself a complex subject.

Attempts to over-simplify matters are doomed to failure, in our view, because of this inherent complexity. Indeed, simple systems that attempt to squeeze many differing risk positions into a single bucket, or into only a few buckets, impose a great burden on best-practice banks. Within the internal risk measurement systems at these institutions, very fine distinctions are made with respect to multi-dimensional risk characteristics. For these institutions, Management Information Systems (MIS) are well tuned to providing data, on an asset-by-asset basis, for purposes of making these fine risk distinctions. When such banks are asked, for regulatory purposes, to group their assets according to more aggregated buckets, several unnecessary costs result: 1) MIS costs rise; 2) the efficiency and accuracy of risk measurement declines (thus leaving regulators with inaccurate estimates of capital adequacy); and 3) the need for, and costs of, regulatory capital arbitrage rise. Thus, the members of our group would embrace a complex, multi-dimensional regulatory system of capital requirements -- provided those requirements are based on best-practice procedures in the context of a specific, well-defined soundness standard.

Some observers have stated that the EDF/LGD matrix, as per the example in Table 2, could be simplified greatly by basing capital charges on the estimated Expected Loss (EL) rate for an asset, instead of separately on the EDF/LGD cell in which the asset resides. For an individual asset, EL over a horizon equals EDF times LGD. Therefore, by basing capital allocations on EL, the matrix in Table 2 could be reduced to a single column of cells (each of which was associated with a specific EL *range*). The RMA Capital Group believes that such simplification would result in a misallocation of capital. In particular, suppose that two assets have identical ELs -- one asset has a low EDF and a high LGD while the other asset has a high EDF but a low LGD. In general, economic capital allocation systems might attribute significantly more capital to the asset with the high LGD (e.g. an unsecured loan) than to the asset with the low LGD (e.g., a secured loan). That is, as LGD rises (within limits) it is likely that LGD volatility rises as well, implying the need for more capital to cover the event of a much higher than expected loss in the actual event of default. As can be seen in Table 3 below -- which shows the pro-

forma internal capital allocations (for credit risk) of the RMA Group at a 99.5% confidence level -- at any given EL, capital tends to be higher for higher LGD levels.

Table 3
Median Economic Capital for Credit Risk, in Percentage Points
(One-year horizon, one-year loan, 99.5% confidence level)

EDF Ranges ↓	LGD Ranges									
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
0-0.04%	0.050	0.150	0.170	0.200	0.230	0.270	0.310	0.350	0.400	0.430
0.04-0.08%	0.080	0.250	0.340	0.420	0.530	0.650	0.700	0.820	0.920	1.040
0.08-0.16%	0.170	0.390	0.650	0.910	1.170	1.200	1.220	1.400	1.590	1.770
0.16-0.32%	0.230	0.590	0.990	1.380	1.500	1.770	2.090	2.400	2.710	3.020
0.32-0.64%	0.370	0.920	1.450	1.970	2.460	3.000	3.550	4.090	4.640	5.180
0.64-1.28%	0.590	1.300	2.200	3.050	3.710	4.530	5.320	6.000	6.670	7.340
1.28-2.56%	0.990	2.300	3.590	4.590	5.570	6.540	7.490	8.440	9.390	10.340
2.56-5.12%	1.540	3.250	5.050	6.450	7.610	9.170	10.510	11.840	13.170	14.490
5.12-10.00%	2.340	4.870	7.250	9.630	11.900	13.600	15.400	17.300	19.200	21.100
>10% but not default	4.000	8.630	13.450	17.610	20.790	25.080	28.540	28.540	29.300	32.200
Default	8.840	18.590	26.200	29.250	29.250	31.510	36.420	29.250	29.250	26.200

[Note: This table contains the median results from the RMA survey. For a more complete description of the results and assumptions, see Appendix 1.]

To see the EDF-LGD effect clearly, look at the *row* consisting of the EDF range of 0.16% to 0.32%. Go to the mid-point between the LGD cells of 40-50% and 50-60%. The interpolated median economic capital is about 1.64%. Compare this with the

economic capital (1.450%) in the next EDF row (0.32% to 0.64%) in the 20-30% LGD cell. This relationship generally strengthens until the last several EDF rows.⁹

It should be clear from Table 3 that, while significant capital changes result from moving between EDF ranges, such is not always the case when moving between adjacent LGD ranges, especially in the lower EDF ranges. Thus, complexity could be reduced by cutting the number of LGD ranges, perhaps in half. Note, however, that as the EDF range rises (especially for an EDF of around 2.56% and above) small changes in the LGD range significantly affect the capital result.

The results shown in Table 3 are for economic capital for credit risk only. All of the RMA Capital Group respondents allocate capital for operational risk (and market risk) as well. However, most of the respondents calculated economic capital for credit risk in Table 3 *independently* of the other two categories of risk. The three forms of risk are not perfectly correlated, however, so that capital held against one type of risk can theoretically be used to absorb losses in the other two categories. Thus, by generally ignoring the cross-risk diversification effects, the capital charges shown in Table 3 overstate theoretically correct economic capital for credit risk.

It should also be noted that, for regulatory capital purposes, a distinction should be made between the number and complexity of the *risk buckets*, on the one hand, and the number of *capital buckets* on the other. To illustrate, consider again Table 3. There are 110 cells -- 11 EDF ranges times 10 LGD ranges. From the bank's perspective, such fine distinctions are necessary to engage in best-practice economic capital measurement. But this does not mean that there have to be 110 different capital buckets for regulatory purposes. That is, the regulators may decide to make capital distinctions in, say, 0.5 percentage point intervals. Counting zero capital as a "capital bucket," therefore, there would be 21 capital buckets between zero and 10 percentage points, inclusively. Suppose further that the regulators wished to add more capital buckets at 1.0 percentage point intervals beyond 10 percent up to, say, 20 percent. Then, the total number of capital buckets would be 30 -- not the 110 cells in Table 3.

⁹ The effects on capital of varying EDF and LGD for any given EL are multidimensional. See the discussion in the Appendix.

The proposed "standardized" approach discussed in the Consultative Paper would add a single capital bucket to the four that now exist, bringing to five the total number of capital buckets -- 0 percent; 1.6 percent; 4.0 percent; 8.0 percent; and 12.0 percent -- corresponding to risk weights of 0%, 50%, 100%, and 150%. As can be seen from the actual economic capital allocations shown in Table 3, the "gaps" between and among these 5 regulatory capital buckets (when compared with the fine gradations of capital in Table 3) would induce best-practice banks to continue to engage in regulatory capital arbitrage.

Determining the appropriate capital allocations for each cell in the EDF/LGD matrix. While it would be up to the regulators to fill in the blanks in the EDF/LGD matrix, it is our hope that these capital allocations are chosen through careful analysis rather than in arbitrary fashion. In particular, the regulator should set capital requirements, in our view, to achieve a particular minimum soundness level at banks. We suggest that, for regulatory purposes, "soundness" should be defined as the probability of insolvency over a one-year horizon. As indicated earlier, insolvency probability is the implicit definition of soundness used within the economic capital allocation systems of all of the RMA Capital Group members. That is, for purposes of measuring economic capital for credit risk, each institution attempts to set capital to reduce to a particular probability the likelihood that credit losses will exceed that allocated capital over the chosen horizon. Within our group, such targeted probabilities range from 0.5 percent down to 0.03 percent. That is, members of the group set capital to "cover" from 99.5% to 99.97% of the estimated cumulative loss probability distribution for credit-related losses.

Part of the variation in numerical probability targets among our members is due to the choice of different time horizons, while part of the variation is due to differences in choices of targeted soundness levels. For example, a bank might use a one-year horizon and wish to adhere to an insolvency probability associated with a double-A debt rating. Using, for example, Moody's full historical database (from 1920-1999) on corporate bond defaults, the expected default frequency for Aa corporates (over a one-year horizon) is approximately 8 basis points. Thus, the bank might set its "coverage" ratio at 99.92 percent. Another bank, might use a three-year horizon and (choosing the same Aa

targeted soundness level and using the same Moody's database) might therefore set its coverage ratio at 99.59% (since the average EDF for Aa's over a three-year horizon is 0.41 percent).¹⁰

The RMA Capital Group recommends that Basel choose a soundness target consistent with a low investment grade rating. That is, we think that capital for credit risk should be set so that (exclusive of other forms of risk) a bank holding the regulatory *minimum* capital for credit risk would receive at least a low investment grade rating for its publicly rated debt. In terms of a numerical insolvency probability, such a "soundness standard" would constitute a requirement that banks hold at least enough capital to reduce to about 0.5 percent over a one year horizon the chances that losses would exceed capital.¹¹ In other words, maintaining a least investment-grade soundness is consistent with holding enough capital to "cover" 99.5 percent of the cumulative credit loss distribution for a one-year horizon. Of course, other horizons besides one year are possible.¹² And individual banks should be expected to want to hold more capital than the regulatory minimum -- i.e., each bank would be expected to achieve a better-than-low-investment-grade soundness status. Indeed, the preponderance of banks in the RMA study attempt to adhere internally to a double-A/single-A soundness standard -- but it is important that a bank's shareholders and not its regulators make the decision as to how much additional capital is appropriate.

¹⁰ The default rates quoted are from Exhibit 30, Moody's 1999 Bond Default Study, which provides average cumulative default rates by overall letter grade (e.g., Aa, encompassing Aa1 through Aa3). There are also some cases in which a bank uses, say, a one-year horizon within the capital allocation model but chooses to compute capital at a lower confidence level than implied by historical default rates for the chosen debt rating at that chosen horizon.

¹¹ We arrive at this number by using Exhibit 31, Moody's Corporate Bond Default Study 1999. Over a one year horizon the average cumulative default rate for Baa3 bonds is 0.31 percent, while the default rate for Ba1 bonds is 0.62 percent. Therefore, the interpolated default rate for a bond on the "dividing line" between low investment grade and the highest non-investment grade is 0.465 percent, which we have rounded up to 0.5 percent.

¹² As the chosen horizon lengthens it should *not* be assumed that required economic capital significantly rises. That is, in order to maintain a low investment grade soundness level, the targeted default probability for the bank should rise with the time horizon. For example, using Exhibit 31 (Moody's op. Cit.) again, we see that the average cumulative default rate for Baa3 bonds over a three-year horizon is 1.34 percent, while the default rate for Ba1 bonds over the 3-year horizon is 3.86 percent. The interpolated default rate for the 3-year horizon is thus 2.6 percent instead of 0.5 percent. When estimating economic capital, this decline in the confidence interval (from 99.5 percent to 97.4 percent) will tend to offset the effect on the loss distribution associated with lengthening the horizon. We expect to provide more information in the future to the Committee regarding the effect on capital charges of varying the time horizon.

While it would be up to the regulators how to assign regulatory capital minimums to each cell within an EDF/LGD matrix, we are aware of at least three basic approaches to such a determination.

1) Developing regulatory models for estimating capital for credit risk. Under this approach, regulators would build their own models, or use commercially-available credit risk models, to estimate capital for loans of given risk characteristics.

While credit risk *models* would be used by the regulators, the resulting estimates would be used within an IRB approach, not within a models-based approach. For example, many commercially-available credit risk models (including CreditMetrics™, CreditRisk+™, and others) in effect estimate a credit loss probability distribution for a hypothetical loan portfolio. Using a specific soundness standard (e.g. a 99.5 percent confidence interval) these models allocate capital for credit risk down to the individual asset of a given rating (or a given EDF, etc.). By assuming that the given asset resides in a portfolio of typical diversification (for a large, complex bank), regulators could estimate the capital allocations for each risk bucket (combination of EDF and LGD) by using appropriate parameters for the credit risk model (e.g., appropriate correlation parameters). Information on appropriate model parameters can be obtained from the model vendors themselves or from independent research conducted by regulatory staff.¹³ We understand that some of the G-10 banking agencies now are actively engaged in such research and we strongly support these efforts. Over the somewhat longer term, such research will be essential to establishing regulatory comfort with a full internal-models approach to capital allocation.

2) Using implied capital allocations associated with publicly rated tranches of asset securitization transactions. When banks and others securitize assets -- including residential mortgages, commercial loans, credit card receivables and a

¹³ For example, loan default correlation coefficients can be estimated or inferred from publicly available "ratings transition matrices," see "Credit Risk Models at Major U.S. Banking Institutions: Current State of the Art and Implications for Assessments of Capital Adequacy," Federal Reserve, May, 1998, pp. 29-30. It is also possible for regulators to make crude estimates of credit risk capital for loans of given ratings by using non-parametric (Monte Carlo simulation) methods on available bond or loan default data. See Mark Carey, "Credit Risk in Private Debt Portfolios," Journal of Finance, vol. LIII, no. 4, August, 1998.

range of other assets -- rating agencies often rate the senior and subordinated tranches of the asset-backed securities issued by the special purpose vehicle. By so doing, the rating agencies are setting an implied capital requirement in order to reach a targeted rating for a particular tranche. For example, the rating agency may state that subordinated tranches must absorb credit losses of the first x percent of the underlying pool (provide credit enhancement of x percent) in order for the senior security to receive a double-A rating. In effect, for that particular pool of assets, the rating agency is saying that capital of x percent is required to meet a double-A soundness standard.

While data on such required credit enhancements is theoretically useful, we caution against the usage of such information by bank regulators interested in setting rational capital minimums. First, the required prior credit enhancements generally apply to an entire *pool* of credits meeting some particular diversification and quality constraints. Such requirements cannot be attributed down to the individual risk characteristic bucket (e.g., an EDF/LGD bucket), which an IRB approach presumably seeks to achieve. Second, the credit enhancements required to achieve any particular rating for the security being enhanced tend to be overly conservative. This conservatism is reflected in the fact that, for most asset types, virtually none of the senior securities of such asset-backed transactions have defaulted.¹⁴

3) Surveying best-practice banks' estimates of economic capital for credit risk. As we have indicated earlier, best practice banks have invested the most in economic capital measurement technology and can provide the regulators with the best information on appropriate capital allocations for credit risk. For reference, Table 3 above shows the median economic capital allocations of the RMA group for commercial loans of varying EDFs and LGDs, using a 99.5 percent confidence interval.

¹⁴ However, spreads on traded asset-backed securities generally are higher than spreads on similarly-rated corporate debt. This likely reflects a) a deeper market for corporates than for asset-backed, and b) a

As indicated earlier, the capital allocations in Table 3 pertain to commercial (and commercial real estate) credits with a term of maturity of one year and an associated time horizon of one year. The RMA Capital Group hopes to provide additional survey information to the Basel Committee regarding economic capital allocations in several other dimensions: a) for retail credits; b) for assets with term to maturity greater than one year; and c) in economic capital allocation models with greater than one year horizons. We will provide such data as they become available.

IV. Risk Mitigation Techniques.

The Consultative Paper, beginning on p. 41, speaks to the issues surrounding credit risk mitigation techniques used by banks. On the one hand, banks should be incented to use such techniques, but, on the other hand, regulators must be assured that capital reductions associated with such transactions appropriately reflect the amount of risk reduction actually taking place. The Paper states that

"The Committee has been considering ways to deal with these issues. In identifying approaches, it is essential to weigh the trade-off between pursuing accuracy in the measurement of credit risk mitigation effects for capital purposes and retaining a relatively simple framework for regulatory capital."

The RMA Capital Group respectfully disagrees with the notion that "retaining a relatively simple framework for regulatory capital" is of great importance. As risk mitigation techniques -- including the use of credit derivatives -- become more commonplace, even smaller banks will become well apprised of the benefits and costs of such transactions, and these banks should not face regulatory disincentives to use proper risk mitigation techniques. Meanwhile, the large, complex banking organizations, in the face of an overly simplified approach, are frustrated in their desires to use risk mitigation techniques. Absent appropriate regulatory capital treatment of such techniques, the advanced-practice banks face severe competitive disadvantages vis a vis their large, non-regulated counterparts.

greater degree of concern over information-asymmetry within the asset-backed market (the fact that the

We therefore believe that the Basel Committee should err on the side of providing incentives to engage in credit risk mitigation, even if the result is a more complex Accord. We also agree with the thrust of the Consultative Paper, that there should be greater concordance between and among the G-10 countries with respect to their treatment of risk mitigation transactions. Below we discuss some of the basic concerns of the Committee as expressed in the Consultative Paper.

- a) Maturity mismatches. The Paper suggests that, when the maturity of the credit protection is less than the maturity of the underlying asset being protected, a simple "add-on" of additional capital be required. Our view is that, rather than an add-on procedure, the capital regulation might emulate industry practice. For example, some of our members treat a maturity- mismatched credit-hedge as consisting of a combination of the underlying instrument and a short position (of shorter duration) in the underlying instrument. Thus, capital on a credit-hedged position should be the difference between economic capital on the underlying asset and economic capital on the (shorter duration) hedge.
- b) Basis risk. Such risk occurs where, for example, the transaction is secured by non-cash collateral or (in the context of netting) where the asset and liability are denominated in different currencies. The Paper suggests that either an "add-on" approach be used in such circumstances or a "hair-cut" on the hedging instrument (thus requiring significant over-collateralization). Again, industry practice might provide a guide to regulators. Each of our participating banks has developed internal procedures for estimating LGD in cases involving non-cash collateral. Provided that such procedures have been supervisory-certified, banks should be permitted to use such procedures within an IRB approach.
- c) Asset mismatches. When the reference assets and the underlying assets are not identical, the Paper proposes that certain conditions apply in order to receive capital relief. In particular, the reference and underlying assets must be issued by the same obligor, the reference asset must rank pari passu or

individual credits in the underlying asset pool are not known by name to the investor).

more junior than the underlying asset, and cross-default clauses must apply. In the context of a hedge in which the obligor is the same but the seniority or other terms of the facility differ from that of the hedge, industry practice can again provide a guide to regulators. That is, the best-practice bank will have in place a process for estimating LGD on the underlying-asset-cum-hedge, taking into account differences in LGDs between the hedge instrument and the underlying instrument. So long as such procedures are certified by supervisors, they should be permitted to provide the basis for an IRB approach on credit-risk-hedges.

- d) The extent of risk reduction. In credit protection transactions involving little or no collateral, the current Accord reduces the risk weight of the protected asset(s) to no less than the 20 percent risk weight of the counterparty (if a bank) providing the credit protection. The Paper recognizes that this treatment gives insufficient weight to the argument that, in order for the protected bank to incur a loss, both the underlying obligor and the bank counterparty must default. The Paper therefore suggests that, in such credit protection transactions, a haircut ("set at a prudently low level") be applied to the risk weight of the counterparty. Again, good industry practice can provide a guide. Some banks estimate the *joint* EDF of the guarantor and the underlying obligor and use this estimate (along with consideration of LGD effects of the guarantee) within their economic capital systems. Such banks should be permitted to use such procedures, if *certified*, within an IRB approach.
- e) Expansion of the scope of capital relief for collateral, guarantees and on-balance-sheet netting (pp. 47-48). The Capital Group agrees with the Consultative Paper's proposal that eligible collateral (and guarantees) should be expanded to include all financial assets (guarantors) that attract a risk weight lower than the underlying assets. However, in principle, the bank with acceptable internal procedures for estimating *joint* EDFs, should obtain capital relief even if the guarantor, on a stand-alone basis, has an equal or higher EDF than that of the underlying obligor. In addition, as proposed in the Paper,

capital relief associated with on-balance-sheet-netting should be extended to all assets and liabilities in the banking book.

V. Regulatory Capital for Operational Risk.¹⁵

The RMA Group takes the view that, given current technology, a minimum capital standard for *credit risk* in the banking book can be set, while capital requirements for "other" risks may be added at a later date. While economic capital for operational risk can be important, and arguably should be added to capital for credit risk, operational risk is not believed to be highly correlated with credit risk. Therefore, we do not believe that a simple add-on (expressed as a percentage of capital for credit risk) is appropriate.

It is also the case that, to a significant extent, operational risk is negatively related to the quality and scope of the bank's control environment. Thus, banks with well-managed and well-designed control systems should receive lower percentage operational risk capital charges than their less-than-best-practice competitors. Control environment factors of importance include the bank's limit-setting systems, compensation schemes, reporting lines (e.g., independence of the review functions), and the quality of the audit function. Additionally, operational risk differs according to the *mix* of lines of business.

We would be pleased to discuss operational risk issues with the Committee at a later date.

¹⁵ The RMA Capital Group does not wish to comment on interest rate risk in the banking book at this time.

Appendix 1:
Details of the RMA Capital Survey

Table 4 below shows the mean, median, and quartile breakpoints for capital allocations of the 11 members responding to the survey. The table shows economic capital for *credit risk* only; each of the respondents allocates capital for operational risk as well. The time horizon for the table is one year and each respondent calculated capital for credit risk by covering 99.5 percent of the estimated cumulative credit loss distribution (see discussion in text). Within each EDF/LGD cell the bank calculated economic capital for a hypothetical commercial loan under two critical assumptions:

- The asset is a *commercial loan* in bullet form with a one-year term.¹⁶
- The asset resides within a commercial loan portfolio that reflects the current portfolio's makeup in terms of the size, country, industrial sector, and internal ratings distribution of loans.

For all respondents, the actual internal economic capital allocation (for credit risk) for the hypothetical asset would be equal to or higher than the number shown in the table, either because the bank internally uses a higher coverage target than 99.5 percent or because the bank uses a longer time horizon, or both. In cases where the internal method uses a higher confidence interval than 99.5 percent, the economic capital modeling process typically permitted the bank to use the lower confidence level (or, in some cases, a lower multiple of the estimated portfolio loss standard deviation).

Across the 11 respondents the actual internal economic capital estimation process differed widely. Some banks used a single equation "default mode" model, some used commercially vended or internally-developed "mark to market" models based on the loan's internal rating (and for which credit losses could be incurred short of default, as when a loan is downgraded), and some used KMV's Portfolio Manager (which requires

¹⁶ For the banks in the sample, the EDF/LGD bucketing process is essentially the same for commercial loans and commercial real estate loans, with correspondingly similar or identical economic capital

EDF™ estimates specific to each "name" in the portfolio, as well as pairwise default correlations for each pair of names in the portfolio).

In most cases, the banks bucketed an asset into an LGD range according to facility characteristics such as the degree and type of collateralization, the degree of subordination, etc. Most banks used 5-8 LGD ranges for internal purposes, although one bank used only a single expected LGD assumption (and accordingly calculated the same economic capital allocation for any asset within a particular EDF row in the table). While the definition of "default" differed somewhat across the banks, in all cases the definition was used consistently both when estimating EDFs and within the economic capital estimation process. Nevertheless, within an IRB system for Basel, it might be appropriate to apply a standardized definition of default. Each of the respondent banks would be able to express their estimated EDFs and LGDs in terms of some appropriately specified standard default definition.

Other than a specification of the EDF/LGD cells, and a requirement that each respondent provide economic capital for a one-year bullet loan over a one-year horizon, the RMA survey allowed the participating banks to specify each of the other parameters that go into their economic capital models. Thus, some banks assumed a constant LGD volatility across all assets while others assigned varying LGD volatilities depending on characteristics of the facilities. In some cases, the LGD volatility was assumed to be zero. The assumptions regarding LGD volatility play an especially important role in determining the capital allocations, if any, for Defaulted loans -- the last row in the table. Two of the 11 banks assigned zero capital for defaulted loans either because of the zero LGD volatility assumption or because of an internal policy in which defaulted loans are written down in such conservative fashion that no economic capital is thought to be needed against the remaining value. The other banks explicitly assume some LGD volatility and thus explicitly allocate capital against the loan value, post-write-down. In some cases, the economic capital assigned to the remaining value rises as LGD rises, then declines as the expected LGD category rises to very high levels. This treatment is based

allocations. For purposes of Tables 3 and 4, all 11 banks computed economic capital for a hypothetical loan for which there was no country risk (i.e., a loan in their home country).

on the argument that for very high expected LGDs (where most of the loan is written off) there is correspondingly less need to hold capital against the remaining value.

The LGD volatility factor represents one reason why the Group's members believe that Expected Loss should be broken into its component parts -- EDF and LGD -- for purposes of setting up a risk-characteristic-based capital standard. That is, for expected LGD ranges most in use at the banks (0-10% up to about 50-60%), the higher the expected LGD the higher the assumed LGD volatility. Thus, two loans having the same EL could have very different economic capital allocations (the loan with the higher LGD having the higher capital allocation). This relationship tends to hold throughout the middle EDF ranges (i.e., except for the very lowest and highest EDF ranges) and for LGD ranges up to about the 50-60% range. But as the LGD range gets very large (above about 50-60%) some of the respondent banks assume that LGD volatility falls again. In this case, when two assets have the same EL, the asset with the higher LGD gets the lower capital allocation (because LGD volatility is lower).¹⁷

In order to arrive at their respective economic capital allocations in the survey, the banks assumed that the reference loan was part of their existing portfolio. Thus, the respondents used diverse assumptions regarding loss correlation coefficients. In some cases, depending on the particulars of the bank's economic capital model, the correlation coefficients were assumed everywhere equal. In other cases, the correlation coefficients were taken to be "typical" of the EDF/LGD cell for which economic capital was being estimated.

¹⁷ It is also the case that in some single equation capital allocation models, for any fixed LGD volatility, the mathematics of the equation (within relevant parameter ranges) serves to reduce allocated capital (for a given EL) as EDF falls and LGD rises.

Table 4

EDF Range	LGD Cells										Mean	Median	25th%ile	75th%ile	
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%					
0-0.04%	0.097	0.154	0.217	0.270	0.334	0.392	0.458	0.524	0.586	0.648	Mean	0.050	0.150	0.270	0.430
	0.020	0.050	0.086	0.111	0.121	0.131	0.141	0.151	0.177	0.197	Median	0.020	0.050	0.086	0.111
	0.140	0.215	0.320	0.430	0.530	0.635	0.740	0.845	0.950	1.050	75th%ile	0.140	0.215	0.320	0.430
0.04-0.08	0.199	0.306	0.408	0.516	0.627	0.734	0.844	0.964	1.074	1.184	Mean	0.080	0.250	0.340	0.420
	0.045	0.125	0.205	0.281	0.367	0.438	0.510	0.536	0.562	0.588	Median	0.045	0.125	0.205	0.281
	0.235	0.450	0.660	0.750	0.865	1.035	1.200	1.370	1.535	1.705	75th%ile	0.235	0.450	0.660	0.750
0.08-0.16	0.321	0.491	0.656	0.835	1.012	1.203	1.377	1.557	1.748	1.932	Mean	0.170	0.390	0.650	0.910
	0.085	0.220	0.356	0.462	0.574	0.685	0.796	0.913	0.994	1.040	Median	0.085	0.220	0.356	0.462
	0.335	0.620	0.925	1.180	1.450	1.725	1.945	2.165	2.435	2.705	75th%ile	0.335	0.620	0.925	1.180
0.16-0.32	0.446	0.694	0.950	1.213	1.479	1.745	2.009	2.285	2.549	2.824	Mean	0.230	0.590	0.990	1.380
	0.150	0.385	0.543	0.704	0.875	1.046	1.222	1.358	1.439	1.520	Median	0.150	0.385	0.543	0.704
	0.465	0.850	1.285	1.635	2.045	2.415	2.735	3.105	3.425	3.825	75th%ile	0.465	0.850	1.285	1.635
0.32-0.64	0.634	1.010	1.390	1.771	2.171	2.562	2.962	3.362	3.768	4.168	Mean	0.370	0.920	1.450	1.970
	0.225	0.600	0.820	1.065	1.321	1.585	1.854	2.068	2.347	2.621	Median	0.225	0.600	0.820	1.065
	0.655	1.185	1.800	2.315	2.895	3.395	3.885	4.375	4.865	5.350	75th%ile	0.655	1.185	1.800	2.315

The EDF ranges for Table 4 were chosen not only for convenience (a doubling of the EDF range from grade to grade) but also because such EDF distinctions result in significant economic capital differences between "grades." For example, look at the 40-50% LGD range in Table 4. Note that median economic capital starts out at 0.23% in the lowest EDF range, then rises steadily to 20.79% in the worst non-default grade (EDFs greater than 10 percent). The EDF ranges chosen for Table 4, and those in use internally at the respondent banks, tend to have much finer distinctions of risk than some of the letter grades of the major rating agencies. This is one reason why we recommend that *numerical* EDF ranges, rather than rating-agency-equivalent letter grades, be used by the regulators. Nevertheless, to provide a frame of reference, Table 5 below shows the correspondence between our proposed EDF ranges and Moody's letter ranges (based on Moody's historical corporate bond default studies).¹⁸

¹⁸ See Exhibit 31, Moody's 1999 bond default study, for one-year horizons.

Table 5

Moody's Letter Grades	Historical default freq.	RMA Group EDF ranges
Aaa-Baa1	0.00% ^a	0 - 0.04%
Baa2	0.07%	0.04 - 0.08%
Baa3	0.31%	0.08-0.16%; 0.16-0.32%
Ba1 - Ba2	0.52 - 0.62%	0.32 - 0.64%
Ba3	2.53%	0.64-1.28%; 1.28-2.56%
B1	3.46%	2.56 - 5.12%
B2	6.88%	5.12 - 10.00%
B3	12.23%	10.00% +
Caa1 - C	19.09%	10.00% +

^a Only ratings of Aa3 and Baa1 have positive default frequencies at the one-year horizon -
- Aa3 at 0.07% and Baa1 at 0.04%.

From this table one sees that, although Moody's has 8 letter grades from Aaa-Baa1, their grades do not provide for much distinction in terms of actual default probabilities. By contrast, the RMA example provides for two EDF ranges (0.08-0.16% and 0.16-0.32%) covering the equivalent of Moody's lowest investment grade category (Baa3). Similarly, the RMA suggested EDF ranges provide for two more EDF categories (0.64-1.28% and 1.28-2.56%) covering the equivalent of Moody's Ba3 category. Only at the very lowest EDF levels -- assets in the equivalent of Moody's B3 and C categories -- does the RMA suggested matrix provide less detail (because such assets would comprise a very small fraction of a typical, sound bank's portfolio).

Appendix 2:
Participants in the RMA Survey and Response

Institutions providing economic capital data for the EDF/LGD matrix.

Bank of America	Bank of Montreal
Bank One	Citigroup
First Union	FleetBoston Financial
KeyCorp	PNC Financial Services Group
Royal Bank of Canada	Union Bank of California
Wells Fargo	

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