

A Quarterly Newsletter from Aptivaa 2010 Number 1

Basel 2.5

A detailed analysis of the latest BCBS consultative document, 'Strengthening the Resilience of the Banking Sector', with a practical perspective on how the proposed changes will impact existing risk management practices.



Stress-Testing, Risk Appetite and Risk Capital Management

Savita Verma Head, Economic Capital RBC Capital



Whither Risk Management?

Jaidev Iyer Managing Director Global Association of Risk Professionals (GARP)



Modelling Approaches for Low Default Portfolios

Seth Aslin Director White Kite Predictive Ltd.



ABOUT US

Aptivaa is a global, full-service provider of independent risk consulting, solutions and analytics services. Our services enable organizations to enhance their performance through better risk and capital management while meeting growing requirements of new regulatory and risk environment.

- Successfully completed over 120 different assignments globally on Governance, Risk and Compliance
- Assisted clients in over 20 countries throughout the Europe, Middle East, South Asia and Africa
- ► More than 50 clients globally including
 - ♦ 3 of the top 10 financial services firms in Europe
 - 8 of the top 10 BFSI organizations in Middle East and Asia
 - Top 12 banks in the Indian Subcontinent
 - Unique distinction of working with two Central Banks
- Voted 1st runners up in the ICICI Bank and CNBC TV18's Emerging India Awards 2008, an initiative by CNBC TV-18, to recognize and honour India's globally competitive small and medium enterprises (SME). Sole financial services firm to be nominated.
- Ranked # 1 consultant for Basel II implementation in a survey conducted by the Indian Bankers Association (IBA)



A New - New World!

Exponent means to set forth or to put into a specified state. This is exactly what regulators, policy makers, and head of states across the globe are trying to do with financial markets.

Events in the last four weeks are clearly pointing toward a new world. A post-Lehman world, or say a post-crisis world driven by regulators, policy makers and of course by public scrutiny. It's interesting to note that while BCBS is addressing the basic definition of Capital, President Obama is finding ways to define a Bank. I am keen to see what comes first.



The Basel committee released a draft paper on December 17, 2009 outlining the proposed changes in the capital accord and liquidity risk measurement. A quick survey of risk managers reveals that many of them are not even aware about the recent Basel documents and even fewer have actually glanced through it. One possible reason could be the timing, since it was close to the holiday period and may be they are reviewing it now.

On January 21, 2010, the US President announced plans to re-define the scope of banks and financial institutions; this follows implementing the approach outlined in the paper published in August 2009. UK has outlined a radical approach under which every bank would be required to write their own will in case they fail.

Most of the proposed changes are centered around the word "risk". It is important to note that "risk" has become one of the most recurrently searched word in Google. In my view the word risk has become extremely important in last few months but sadly the phrase "risk manager" has not. So business continues to override risk management decisions. This is a paradox which is true for most risk managers across the world . I guess it has been like that before, during and after the crisis. In my recent discussions , the CRO of a large bank commented "Nobody understands risk management outside the risk management department". I asked him do they really want to? The need to understand risk management at every level has grown immensely be it at the level of the Board, Chief Executive, or the business unit.

But what about risk managers? This question has prompted us to think, look around and discover that though there is voluminous literature available on theoretical aspects of risk, there is very little which talks about the "practical and implementable aspects". I believe that learning and sharing of knowledge with our clients and associates who are actual practitioners would be a useful initiative. So with this objective, we have put together the first edition of Exponent featuring articles on recent Basel II proposals, modelling low default portfolios, and scenario-based approach for AMA. Our sincere thanks to Jaidev Iyer, Managing Director, GARP, Dr Savita Verma, Head, Economic Capital, Royal Bank of Canada, and Seth Aslin, Director, White Kite Predictive Ltd., who have kindly agreed to contribute in this issue.

We eagerly wait your feedback and contribution to make this newsletter better each time. Lastly, I wish you a very happy 2010 and safe banking!

Alok Tiwari CEO | Aptivaa



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Regulatory Update

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Do Advanced Approaches Save Regulatory Capital?



The question still remains whether actually capital would be saved by moving towards advanced approaches or it will add to the cost. It is difficult to underwrite that the regulatory capital requirement may come down using advanced approaches ne of the scarcest commodities for banks today is capital. Every bank is trying to minimize the regulatory capital by aiming to shift towards advanced approaches suggested by Basel II for all areas of risk (credit, market and operational). There are advantages if a bank is successful in moving towards the advanced approaches but there are a lot of prerequisites which need to be fulfilled before even contemplating advanced approaches which involve a lot of cost. The question still remains whether capital would actually be saved by moving towards advanced approaches or it would add to the cost. It is difficult to underwrite the regulatory capital requirement and it may come down using advanced approaches. We have tried to demonstrate a case study for operational risk, showing that capital required may come down in the long run.Operational risk was among the latest additions in Basel II and is different compared to credit and market risk both in terms of its definition and measurement, as shown in the table on the next page.

The unique quality of operational risk that makes it very different from credit and market risk is that the measurement and management aspects are two uniquely independent aspects and are not directly linked to BIA (Basic Indicator Approach) and TSA (Total Standardized Approach). The management aspect includes the governance structure, policies, RCSA (Risk Control Self Assessment), KRI (Key Risk Indicators), loss data management and the risk mitigation or risk transfer techniques. The measurement of operational risk capital for the Basic indicator and TSA is done using gross income of the bank which has no direct linkage with any of the components in the management of operational risk. The key to operational risk lies in properly executing and implementing the frameworks for all components of management of operational risk and regularly monitoring them so that it helps the bank during measurement of the operational risk capital using advanced approaches and also builds a culture within the bank to highlight issues and learn from mistakes. It adds to the cost initially while setting up an operational risk department, especially while implementing the different components of the management of operational risk. Most risk managers have to frequently justify the cost incurred in implementing the governance structure, RCSA and KRI frameworks, especially if the capital requirement does not drop. The answer is simple; we have to discount the initial cost for setting up and implementing the components of operational risk management as an investment. This decision may not save any capital requirement if the bank chooses to use BIA or TSA for the measurement of operational risk capital but it may bring down the capital requirement significantly under AMA (Advanced Measurement Approaches) if all the components of management of operational risk have been implemented and practiced religiously.

		MarketRisk	CreditRisk	Operational Risk
Risk Position	Quantifiable Measure	Yes	Yes	Yes
	Exposure Measure	Position; Risk Sensitivity	Money Lent, potential exposure	Difficult – no ready equivalent position available
Completeness	Portfolio Completeness	Known	Known	Unknown
Context	Context dependency	Low	Medium	High
and Data	Data Frequency	High	Medium	Continuous
Relevance Measurement	Applicable for Departments	Treasury and Market risk	Credit Department	Throughout the Bank
anu vaildation	Testing	Adequate data for backtesting	Backtesting difficult to perform over short term	Results very difficult to test over any time horizon

Rational for moving to advanced approaches

Operational risk encompasses good governance, proper controls and regular monitoring of these through self assessments throughout the bank. However the operational risk capital requirement for BIA and TSA is linked to gross income of the bank, which is not related to good governance or proper controls. Even if the bank has the best governance standards and controls, if the gross income is high, the operational risk capital charge will be high. This has forced many growing banks to think of advanced approaches as an option if it can save the regulatory capital requirement.

We tried to compare the growth in operational risk capital and the growth in operational losses year on year for the Indian banking industry as shown in the graph alongside:



Assumptions made:

- > Gross Income: includes Net Interest income and other Fee based incomes
- Provision: includes provisions for contingency, other provisions and writeoffs and excludes provisions for doubtful loans and NPA
- Provisions are considered to be a proxy for actual operational loss data as the actual data was never captured
- Operational risk capital is assumed to be 15% of gross income as mentioned for BIA

The graph clearly shows that the gross income of the industry has grown considerably compared to provisions (used as proxy for operational losses). This huge gap between the two lines has forced banks to consider AMA as a viable

option. The requirement of 5 years internal loss history to move towards AMA has also been relaxed by most of the regulators

by permitting the use of external scenarios to populate the losses and with proper scaling (BEICF).

Case Study comparing the capital requirement for a department of a bank using BIA & AMA

We started again by taking the last ten years of the gross income data and the provisions data for the particular Bank and assumed the null hypothesis that "the Proposed Capital (15% of GI) is less than or equal to actual losses" and tested the hypothesis using t-test for difference of mean and the result was as shown.

The t-statistic was in the rejection region; hence we rejected the null hypothesis implying that the proposed capital in BIA (15% of GI) is significantly higher than actual losses, with 99% confidence. It solved half the problem by showing that the capital used in BIA was

	Capital (BIA)	Provisions	
Mean	52.41	12.28	
Variance	615.73	29.79	
Observations	10	10	
df		9	
t Stat	6.09		
t Critical one-tail	2.82		
P(T<=t) one-tail	0.00009		



significantly higher than the actual losses but the other half yet to be proved was whether the capital requirement using internal loss history and external scenarios would also be lesser than the capital requirement under BIA.

The Bank had estimated Rs 30 Billion (\$750 MM) for operational risk capital using the Basic Indicator Approach (i.e. 15% of Gross income). The single largest loss ever faced by the Indian banking industry in total was of Rs 12 Billion (\$300 MM).

We estimated the AMA capital requirement for one pilot department of the bank using external scenarios (due to lack of internal loss history) and compared the amount allocated for the pilot entity from the estimated Rs. 30 billion for the same pilot entity as shown below.



The capital saving for one pilot entity was more than \$1.3 million (\$3.8 MM - \$2.5MM). The saving of \$1.3 MM is over a base of \$3.8 MM which is 0.51% of the total \$750 MM. Therefore, if this figure is aggregated over all the departments of the bank it can make a huge difference to the regulatory capital needs of the bank. This does not imply that every bank should move to the advanced approach at the earliest as the prerequisites (as shown in the table below) for Advanced approach involves a lot of hard work, diligence and initial cost and if the regulators are not convinced of the implementation of the operational risk management framework, the bank may not get permission to move towards AMA.

Qualitative/ Quantitative Requirements		Basic Indicator Approach (BIA)	Standardised Approach (SA/ ASA)	Advanced Measurement Approach (AMA)
iont	Self assessment (Qualitative)	×	~	4
anagen	Key Risk Indicators (Qualitative)	×	4	~
×	Loss Data Management (Qualitative)	×	~	~
Measurement	Using gross income (Quantitative)	×	~	
	Using Loss History (Quantitative)			~
	Using External Scenarios (Quantitative)			~

Disclaimer: All the numbers used in the case study of the bank are indicative numbers

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Modelling Approaches for Low Default Portfolios



Introduction

Building credit risk models for so-called 'low default portfolios' (LDPs) is a challenging but necessary task for banks pursuing Advanced and (to a lesser degree) Foundation status under the IRB (Internal Ratings-Based) rules. The sheer number and relative materiality of LDP portfolios places this issue squarely on the radar of Chief Risk Officers; risk managers; staff within portfolio analytics; model builders; the managers of model builders; and managers within group risk functions.

In this first of a series of articles, we will look at how LDPs present a constant dilemma for model builders and critically examine the approaches typically adopted by banks. More specifically, this series will contend that modelling teams approach this dilemma in a binary sense: choosing exclusively between (1) a purely statistical method, or (2) the use of subjective expert opinion.

Either way, the process can be a profoundly frustrating one. A purely statistical approach can struggle to gain traction on the sparse data associated with an LDP, whereas using expert judgement feels inherently 'unscientific' to some modellers. The latter option is usually regarded as a regrettable contingency.

Focusing exclusively on credit risk modelling for LDPs, we will argue that many analysts and modellers in the wider Basel community tacitly believe that there is a complete no man's land between statistical model building and using expert opinion alone. We hope to progressively deconstruct that view and suggest modelling practices that, collectively, could be construed as a 'third way'. These non-technical articles are aimed at executives and managers rather than modellers. In this series, we are aiming to raise awareness about the wide number of options associated with building and implementing models for LDPs.

Low Default Portfolios

LDP issues were acknowledged relatively early in the Basel II process. In 2005, the BCBS published a short newsletter that set out some salient points of LDPs: their identification and quantification by banks; their treatment under IRB; the role of Supervisors; and a set of validation principles.

This article captures some concerns of the industry at that point in time—principally, their admissibility as IRB portfolios—and confirms that a lack of historical data will not automatically exclude a portfolio. A clear emphasis is also placed on the importance of probing the true risk posed by a given low default portfolio. Any two LDPs may share a superficial connection, in that they both exhibit a low observed default rate, but the underlying risk dynamics may be very different for each. Is the portfolio of inherently low risk? Or are basic data issues masking a higher level risk?

The term "low default portfolio" resists exact definition. Despite this difficulty, it is incumbent upon banks to introduce some specificity on this issue where modelling policy is concerned.

Each bank usually develops its own definition—and related policies—for the purpose of classifying models as LDP. Typically, a boundary is set for

the absolute number of defaults; e.g. a portfolio exhibiting below (say) 20-30 defaulted cases is marked as an LDP and attracts different requirements for validation as a result. By contrast, the relative number of defaults is usually not a primary aspect to this definition. As we shall see however, the relative number of defaults is also important.

Collecting data across a longer period of time does not necessarily alleviate the LDP problem although it is a common strategy. Even if data were available for an LDP in this way, a large 'sample window' brings its own problems. Defaulted cases that are widely separated in time do not necessarily have the same 'joint distribution', meaning that the key statistical relationships between risk drivers, and observed default rate, are not necessarily constant through time. Data from the distant past may not be representative of the immediate future portfolio.

For the purposes of these high-level articles, a working definition of an LDP is as follows:

- 1. a portfolio that consistently exhibits a low absolute (and potentially relative) number of defaults;
- 2. a portfolio that also, potentially, exhibits one or more of the following attributes:
 - a. is composed literally of very few exposures, to an extent that even a moderately high default rate could potentially produce very few default instances;
 - b. is of inherently high credit quality;
 - c. is a new portfolio, with no history of defaults.

From a purely modelling perspective, these portfolios are almost always represented by a physically small development sample. This sample may also exhibit other data-related problems that complicate the modelling process. We will not embed this inside the LDP definition for the moment but will return to the concept repeatedly in the series.

In addition to default incidence being a consideration, portfolios can also be low loss portfolios. In a sense, this additional restriction on available data impacts LGD modelling in the same way that LDPs directly affect PD modelling. We will address these issues as well, in later articles, when examining the wider LDP problem set for AIRB modelling programmes.

Why are LDPs so prevalent, as claimed in the introduction? Aside from the attributes cited in our working definition, there is at lest one other factor that can aggravate the LDP problem: model segmentation.

In the quest to implement predictive models, banks often find themselves 'segmenting' a model—meaning to replace a single model with multiple, segment-specific models. Segmentation in corporate and commercial portfolios can be driven by many factors: region, industry, company size, borrowing purpose—or any of these factors in combination.

Segmentation is an intuitively appealing way to improve risk measurement as the process usually matches a more tailored set of risk drivers (i.e. model factors) to a homogeneous subset of a portfolio. Unfortunately, segmentation can actually exacerbate the LDP problem by (a) reducing sample sizes even further and consequently (b) making it harder to guarantee/validate the increased predictive power ascribed to these models. The pros and cons of segmentation—attractive as it may be as a modelling option—need to be weighed against the small sample problem.

At the risk of stating the obvious, the low default nature of LDPs is not an issue in and of itself; the problem is how to build credible, statistically-

defensible models on low levels of data. Small samples with irregular data structures will challenge the average modeller and strain the limits of standard statistical techniques. As a result, we often talk at White Kite about 'low data environments', as opposed to 'LDPs'. These are broader concepts that include low default portfolios as a subset.

Sometimes, it is not that the overall dataset is small: technical problems can also arise when the number of defaulted cases is low enough to undermine the parameter estimation process. The number of 'cases' in the target subset may possibly be so low that the conditional distributions of the explanatory variables are very poorly defined. Some statistical routines experience serious stability problems in this situation.

Portfolios need not literally be low default portfolios for small sample problems to arise. If the available data is of low quality, then filtering may reduce an otherwise non-LDP portfolio to an LDP-style modelling problem. This scenario is one of the main motivation behind the reference to "low data environments" rather than LDPs.

The Basel Parameters

Each of the primary Basel II parameters (PD, LGD and EAD) are affected slightly differently by the problems associated with LDPs.

PD models are affected by poor data in two principal ways:

- 1. a negative impact to discriminatory power (the ability to discriminate between good risk and bad); and
- 2. an inability to accurately calibrate the model to an observable default rate.

As indicated earlier, the second point seems to be the issue that is most often targeted or identified by published material on LDP research. We will discuss both through this series.

LGD models are affected differently by the LDP problem. Recoveries are a subset of defaults in the sense that not all defaults lead to a recovery process. This places an immediate upper bound on the amount of recovery data that might be generated by any given default. Consider also that each default may involve a different collateral class, further reducing the amount of data available to analyse intrinsic recovery rates. Finally, it is not unusual for banks without previous experience in LGD model development to not have the necessary loss and recovery data collection systems in place, further compounding the data problem.

An issue that deserves special mention is the time effect associated with LGD data. Default may be an event, but any associated recovery could stretch across years, thinning the data considerably. Assembling complete recovery cases creates a further impediment to statistical modelling on LDPs.

In short, building LGD models for low default portfolios is as, if not more, difficult than PD models. Modellers typically face severe data constraints for development (and later validation) of in-house LGD models. The challenge is to show that every avenue to work statistically has been exhausted before using expert opinion as a basis for parameter estimation. Even then, modellers need to show that they are using expert input in a balanced, conservative manner.

We will return to LGD modelling at a later point in this series as it is one of the most significant stumbling blocks (from a modelling point of view) for banks in pursuing AIRB status.

EAD models are also directly affected by the data conditions surrounding

LDPs. The upper bound imposed by limited defaults is the first constraint. The presence of multiple credit products has a similar data-reducing effect as that seen in the LGD context. In addition, the primary data for EAD modelling frequently takes the form of a noisy, time series that can complicate the analytic process.

The State of Play

We started this article by suggesting that the decision process followed by model builders and their managers is severely challenged by the data issues associated with LDPs. We strongly believe that the modelling approach selected for many LDP models reflects a limited understanding of the true breadth of methodological options open to a modeller in the presence of poor data.

- Specifically, we believe the following to be a fair summary of typical attitudes, responses and actions to the LDP dilemma:
- 1. Modellers will often use a statistical method on a small sample...
 - a. ...without knowing or verifying the full assumptions underlying that method and the biases that may be induced in this context;
 - with no real understanding the effects of small sample size on measuring classification performance, accuracy and parameter stability;
 - c. ...without any sense of how the model may be over-fitting the data (or what to do about it);
 - d. ...without performing any exploratory data analysis beyond basic univariate plots and correlation matrices;
 - e. ...without considering the statistical significance of coefficients in any depth;
 - f. ... without considering the standard errors of key tests, measures or sampling statistics (such as the Gini coefficient);
 - g. ...and will often focus excessively on single metrics (such as goodness of fit) as a measure of modelling 'success'.
- Modellers will often revert to using expert opinion as the sole basis for building a model if they believe that a statistical approach is not viable.
- When modellers do elect to use expert opinion, they do so in such a way that is completely heuristic; unsystematic; predominantly consensus based; and does not make any adjustments for the biases present in human reasoning and subjective estimation.
- When modellers are aware of advanced, non-standard methodologies, they often presume that they will not have sufficient technical knowledge skills for implementing these methods.
- Most modellers believe that there is no 'third option' beyond (a) using standard statistical methods (the ones they know) and (b) using expert opinion, to parameterise a model.
- Modellers (and members of group risk functions) believe that regulators will not approve of non-standard approaches, dismissing anything that doesn't come from an undergraduate textbook as being a 'black box'.

Admittedly, the first point may be overly critical—few modellers will fall foul of all the issues named in that list. The point is that the average modeller will often run statistical routines without checking the technical assumptions that could tell them to what degree a method is working correctly on a given sample.

At the risk of massively oversimplifying, the tacit consensus seems to be that models are either specified statistically (using fairly standard methods) or constructed subjectively. There are no viable third options, or alternatives, to complement the two standard approaches.

Options

Nothing could be further from the truth. There is literally a universe of techniques designed for problematic data conditions. Perhaps more tellingly, there are entire disciplines devoted to building (and operating) robust models in poor data environments.

Without question, Risk is an advanced and highly quantitative discipline within the banking industry. However, when it comes to the quantitative modelling of small samples, other industries have moved well beyond the borders defined by standard methods to create a rich fusion of advanced methods for small sample modelling. There are numerous medical, scientific, military, financial, technology, engineering and social science contexts within which advanced extensions to mainstream methods have been used to great effect.

In terms of technical disciplines, there are several which have become

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known for utilisation and development of these methods: bioinformatics, machine vision, pattern recognition and machine learning, operational research, data mining, artificial intelligence, signal processing, to name a few. All of these disciplines have explored the use of advanced, non-standard methods in critical settings, on poor data.

As we will see in the course of these articles, some of these disciplines have generalised the problem of building statistical models for classification and regression. One field in particular – statistical learning theory – has even constructed a conceptual framework that attempts to unify model-building techniques and processes. It does this by deconstructing the modelling problem and systematically identifying all of the fundamental mathematical structures that could be used to predict or classify a target value.

Despite the fact that datasets in banking sometimes have similar structures to the ones encountered in the disciplines and industries cited above, there has been very little diffusion of these methods into the modelling teams that staff the credit risk functions in banks.

Throughout these articles, we will frequently use the term "standard methods", referring to the statistical methods and model development processes that define mainstream approaches to model building. Standard methods derive parameters entirely from the data, using basic parameter estimation processes, and do not make any systematic use of

expert opinion. These terms may also be used when discussing model structures, not just processes.

It may seem strange to draw attention to standard methods and treat them as a kind of category for critical analysis and discussion. However, we will carefully and deliberately re-cast these methods as foundations upon which we can build more advanced approaches. This will be a recurring theme.

By contrast, the term "non-standard methods" (and similar) will collectively refer to methods that do any or all of the following:

- modifies or augments the core sample data to facilitate parameter estimation;
- mathematically blends expert opinion with data;
- uses non-linear model structures;
- uses iterative, algorithmic processes of estimation as opposed to simple, one-step calculations;
- incorporates procedures that prevent over-fitting the sample; and
- > finds predictive factors in a massive number of dimensions.

Advanced, non-standard methods have been developed for predicting outcomes, classifying, smoothing, filtering, ranking, parsing, clustering, simulating, tracking, estimating parameters, mining association rules, learning preferences, fitting curves, detecting patterns – the list goes on. More importantly, a significant proportion of these techniques were developed to work with just about every problem a data sample could exhibit.

To conclude this introductory article, we catalogue some of the standard questions associated with this area of modelling:

- If these methods are so powerful, why aren't they more commonly used in mainstream credit risk modelling?
- Are these methods beyond the reach of the average modeller? Are they complex?
- > Do these methods produce 'black boxes'?
- How do regulators perceive the use of advanced low-data methods?

In the course of this series, we will address each of these issues and explore many related themes. The next few articles will specifically examine the following areas of LDP credit risk modelling in the context of Basel II:

- > Advanced statistical methods for small sample modelling
- Best practices and protocols for building models using expert opinion
- Mathematical approaches for using both expert opinion and data in the same model build process
- > LGD modelling in low data environments
- PD model validation for LDPs
- > PD model calibration for LDPs

¹BCBS, Basel Committee Newsletter No.6 (September 2005), "Validation of lowdefault portfolios in the Basel II Framework".

²Probability of Default; LGD Loss Given Default and; Exposure at Default respectively.



Seth Aslin, Director, White Kite Predictive Ltd.

White Kite Predictive Ltd. is Aptivaa's strategic partner in the domain of advanced credit risk modelling.

Educated in Australia and the UK, Seth holds a BSc in Aviation Science as well as an MSc in Operational Research from the London School of Economics. In 2005, he completed the highly-regarded Certificate in Quantitative Finance (CQF) in London, an intensive programme focused on stochastic models for the risk management and pricing of derivatives.

Seth left Royal Bank of Scotland (RBS) as the head of one of the bank's Basel II risk modelling teams to launch White Kite with Lyle Jackson, to provide focused consulting services to the banking and financial services sector. While at RBS, Seth led several projects including the development of a simulation-based value-at-risk platform that measured residual value risk across several large leasing portfolios and time horizons. He ran the Bank's PD (probability-of-default) modelling function, responsible for model development; model validation; and calibration of rating scales. In this role, Seth initiated and led a comprehensive redevelopment of the Bank's quantitative methodologies for model development and validation, contributing also to the Bank's application for AIRB status under Basel II. Prior to running the PD team, Seth designed an LGD framework that leveraged the Bank's priority forecasting and valuation models.

Before turning to banking, Seth worked for several companies in the aerospace industry, providing modelling support to the leasing and sale of commercial aircraft in Australia, the Pacific region, Europe and the US. Unable to resist the coming boom, he was also the cofounder in 1999 of a US-based Internet company that developed a set of online trading applications for the aerospace industry. During this period, Seth spoke at multiple conferences and air-shows, across the US and Europe, regarding Internet strategy and supply chain evolution.

Seth's continuing focus is on probabilistic and predictive modelling methods-especially non-parametric techniques more connected with pattern recognition and machine learning. In the credit risk context, he specialises in methods for working with problematic data sets such as might be encountered in low default portfolios. Using these methods, he has developed advanced approaches for model development, parameter estimation and model calibration.

With a lifelong interest in aircraft and aviation in general, Seth has held a private pilot's licence in Australia and hopes to renew this licence in the UK.

Basel 2.5

At the time when risk managers across the globe were busy finalizing their Christmas and New Year holiday plans, the Basel Committee on Banking Supervision had already planned their work schedule for 2010 asel Committee on Banking Supervision (BCBS) on 17th December, 2009 came come out with a consultative document - 'Strengthening the resilience of the banking sector', which proposes significant reforms to the regulatory framework governing banks. This article attempts to provide a broad overview of the changes suggested, the reasons for the same and the possible impact on banks across the globe.

The document focuses on the following:

- > Strengthening the global capital framework by raising the quality, consistency and transparency of the capital base
- > Enhancing risk coverage of the capital framework
- > Supplementing the risk-based capital requirement with a leverage ratio
- > Reducing procyclicality and promoting countercyclical buffers
- > Introducing a global liquidity standard

Capital Base

What is changing?

The idea is to increase the quality of capital and enhance focus on the common stock component of Tier I capital which is generally considered to be of the highest quality in terms of its ability to absorb losses without placing the bank into insolvency. The proposals take into account the debate that has been raging for a while on the prudence of allowing innovative instruments as Tier I capital and whether the Tier I capital's sanctity is affected by such dilutions.

As part of the focus on common stock and to preserve the sanctity of Tier I capital, the entry criterion for inclusion in Tier I capital will be strengthened and "innovative" instruments which do not meet strict criteria for absorption of losses while the firm is a going concern will be phased out.

Against the earlier practice of equal deductions from Tier 1 and Tier II, most of the regulatory deductions like goodwill, deferred tax assets, shortfall in provisions etc will now be from common equity only.

In addition to the already existing minimum requirement for Regulatory capital (Tier I and Tier II combined), new explicit minimum requirements for common equity and Tier 1 capital as a percentage of risk-weighted assets will be introduced.

Other proposed changes related to the capital base include a move towards simplicity and transparency with the Tier 2 capital instruments to be harmonized and the Tier 3 capital used for covering market risk eliminated. As a measure of increased transparency, all elements of the capital base will be required to be reconciled with the financial accounts and disclosed.

What impact will it have?

To meet the extra requirement of common equity, banks will have to significantly increase the percentage of their common equity in the total capital base. The flip side to this is that once the extra capital is raised, they would be on a far better footing to cope with any future shocks without causing the large scale panic and market disruption that we witnessed at the start of the current crisis.

Risk Coverage

What is changing?

The capital requirements for counterparty credit risk (CCR) for exposures arising from derivatives, repos and securities financing activities will be enhanced. These instruments were seen as the main cause of the crisis and the changes are designed to address some of the concerns raised against these products.

The current crisis showed that banks lost more due to the deterioration in the credit -worthiness of a counterparty rather than outright default. To this end, banks will be subject to an extra capital charge for mark-to-market losses due to credit valuation adjustments (CVA) or deterioration in the credit worthiness of the counterparty. The CVA losses will be captured by using a bond-equivalent approach. The total exposure to counterparty will be treated as the notional for the bond and the market risk capital charge for this "bond-equivalent" will be the capital charge for CVA.

Given that a lot of derivative instruments today have integrated credit and market risk inbuilt into them and that during periods of market volatility, counterparty credit risk charges were seen to be quite low and not able to properly capture general wrong-way risk, going forward counterparty credit risk capital charge will be calculated using stressed inputs. The effective Expected Positive Exposure (EPE) which is the basis for determining the Exposure at Default (EAD) for the counterparty will be calculated using stressed inputs for market linked factors like volatilities and correlations.

The interconnectedness of financial institutions through the derivative markets created systemic risk and new measures to neutralize this risk include extra capital charges for bilateral OTC derivatives, zero capital change for transactions with central counterparties and efforts to promote strong central counterparties.

Further, extra capital charges through the use of a multiplier of 1.25 on the asset correlation formula used in capital calculation will be levied on exposures to large financial sector entities so as to capture the empirically observed extra correlation for financial firms as compared to corporate sector exposures.

What impact will it have?

Banks will have to revisit their risk management standards for counterparty credit exposures and ensure that their stress testing methods, back-testing of

counterparty credit risk, the process of model validation, collateral management and margining standards are all designed to capture the risk accurately so that in any further crisis they are not caught off-guard.

They will have to look at moving away from bilateral OTC transactions amongst each other and towards transactions with central counterparties. The whole underlying message to banks is to avoid too many exposures to each other so that in case one bank fails, others are not affected too much.

Institution	Year	Tangible Assets (Bn)	Tangible Common Equity(Bn)	Leverage Ratio
Top 5 Canadian	2007	\$2,122	\$65	32.1
	2008	\$2,529	\$68	37.1
Banks	2009	\$2,405	\$78	35:5
Top 10 US	2007	\$6,936	\$270	26:1
	2008	\$8,139	\$235	35:1
Children	2009	\$8,261	\$422	20:1
	2007	\$2,132	\$58	37.1
Cagroup	2008	\$1,097	\$30	64.1
	2009	\$1,854	\$106	17:1
Royal	2007	£1,791	E3	574-1
Bank of	2008	12,382	639	01.1
Scotland	2009	£1,843	£38	48:1
	2007	6802	E12	50.5
Dexia SA	2006	€649	62	377.1
	2009	€590	.65	116.1

Leverage

The blame for the recent financial crisis has been foisted on complex derivatives; oftentimes more out of convenience than for any other reason. It does not take much analysis to show that the causes were more fundamental. As the framework stands today, a bank could hold as little as 2% common equity to risky assets. One look at the numbers in the table below will reveal the obvious.

The committee has thus renewed focus on what is the core aspect of banking - leverage.

What is changing?

The committee is proposing the introduction of a non-risk based leverage ratio to complement the risk weighted approach for regulatory capital that is being used now. The changes proposed in the consultative document include the following:

The capital measure to be used for this leverage ratio will be composed of only the high-quality tier I capital (common stock plus retained earnings). Banks will also have to ensure consistency in the accounting and regulatory calculations for exposure and capital (consistency of deductions made and avoidance of double counting). This change will ensure that the capital

kept by the bank is robust and capable of absorbing losses sustained during a crisis as a high quality of capital will have to be used for calculation of leverage measure which will be monitored.

- > The exposure measure used for the calculation of the leverage ratio will preferably be a non-risk based accounting measure consistent with the aforementioned guideline. For the exposure measure, in addition to the on-balance sheet loans, most of the off-balance items will be considered using a flat 100 % credit conversion factor.
- > No netting or any kind of credit risk mitigant will be allowed to reduce the exposure amount. This includes disallowance of the use any type of physical and financial collateral or guarantees to reduce on-balance sheet exposure as well as the disallowance of netting for derivatives, repo style transactions and loans against deposits.
- > The committee will require rigorous norms in the disclosure of the proposed measure and will carefully consider a calibration so as to get an internationally consistent leverage measure that will achieve the objectives of supplementing the risk based measure and avoiding the buildup of excessive leverage in the banking sector.

What impact will it have?

In totality, these measures will force banks to either raise large amounts of equity to sustain their current levels of business or they will have to sell off parts of their assets. Looking at the current levels of leverage ratio for most of the major banks in the world, the leverage measure, in the short term, may create some disruptions in credit growth and a downward pressure on asset prices. Instead of asking banks to comply with newly prescribed ratio straightaway, if the ratio is brought down in a phased manner, the short-term destabilizing effects can be minimised.

Procyclicality

The recent economic crisis demonstrated that the Basel II risk capital regime with its focus on enhanced risk sensitivity became procyclical in nature and amplified the economic and financial shocks. During the good times, the risk parameters were benign and consequently capital requirement was low. As the crisis starting taking shape, banks started suffering losses and the risk parameters became demanding. So banks got hit by a double whammy of having less capital and having to keep more capital for its existing. They stopped lending to all but the highest rated borrowers thus channelling funds away from the sectors and businesses that need funds the most, proving disastrous in times of an economic crisis. In the Indian sector itself, there are cases of banks completely stopping lending to the SME sector during the last quarters of 2008. While the government and the RBI tried their utmost to cajole banks into lending, the philosophy of 'safe' lending proved too deep rooted to change at short notice.

What is changing?

In view of this downward spiraling effect of procyclicality, the following changes have been proposed by the committee.

- > Proposition to use a downturn probability of default (PD) estimated using historical PD values.
- > In a move towards forward looking provisioning, the committee is advocating a change in accounting standards to an expected loss approach in lieu of the current incurred loss approach.
- > The committee has also tried to evolve a framework to build counter cyclical capital buffers that can act as cushions in times of crisis. Taking note of the hefty bonuses and dividends paid out by banks during the economic crisis because of a fear of being perceived as weak otherwise, it has tried to rectify the situation by building a framework that will establish a buffer range above the minimum capital requirement. Capital distribution constraints will be imposed on the bank when capital levels fall within this range. For example if capital level falls to a level above the minimum requirement equal to 50%

of the size of the capital conservation range then the bank cannot payout more than 20% of its earnings in the subsequent financial year.

> Introduction of a measure (such as a macro-economic variable of a group of variables) that will ascertain whether the credit in a particular jurisdiction has grown to excessive levels, based on which a benchmark will be decided for the aforementioned capital buffer requirement.

What impact will it have?

Due to the use of downturn PD estimates and a forward looking provisioning, Banks will have to keep increased capital to meet the regulatory requirements but the volatility of the capital requirements would be lessened. An added buffer as proposed will further act as a cushion against a highly volatile capital

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The renewed focus on high-quality capital and leverage is an admission by the Basel Committee that the risk weighted approach has proved to be insufficient. However it is ironic that on the path to Basel 3, the committee has fallen back on a methodology of yore.

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requirement. By changing the prescribed capital buffer levels across the banks, the national supervisory regulator may avoid the scenario of excessive credit growth preceding a downturn, akin to Alan Greenspan's 'irrational exuberance', which only precipitates and accentuates the crisis.

These measures will effectively ensure that the capital (and the added buffer) are at a sufficient level at all times ensuring that the bank has significant cushion in case of a crisis event as was seen recently.

Liquidity standard

The 'irrational exuberance' also led to several banks playing ostrich and believing that funds would continue to be available at a low cost. When the reversal finally did happen, the central banks had to support the money markets and even individual institutions. The committee is now looking at introducing standards that will encourage strong liquidity base and internationally harmonized global liquidity standards.

What is changing?

Two new two minimum standards include a 30 day liquidity coverage ratio (LCR) and a longer term structural ratio called the Net Stable Funding Ratio (NSFR) to address liquidity mismatches and

provide incentives for banks to use stable sources to fund their activities. LCR identifies the amount of unencumbered, high quality liquid assets an institution holds that can be used to offset the net cash outflows under a stress scenario. NSFR on the other hand measures the amount of longer-term, stable sources of funding employed by an institution relative to the liquidity profiles of the assets funded and the potential for contingent calls on funding liquidity arising from off-balance sheet commitments.

The committee has also prescribed certain metrics to be tracked by all national regulators like contractual maturity mismatch, concentration of funding, available unencumbered assets and market related monitoring tools like equity prices and CDS spreads. It has also recognized the fact that such monitoring should be on an ongoing basis and there should be a fair amount of uniformity across all the regulatory prescriptions. The committee has not yet specifically focused on intra-day liquidity risk.

What impact will it have?

For banks these measures mean extra focus on building a stable diversified funding base and cutting down the reliance on unstable wholesale funding from other banks and large corporate. Banks will have to go back to the old days and ensure that they have a big retail deposit base as that's the stickiest form of funding.

Conclusion

The new BCBS consultative paper is clearly designed to strengthen the banking sector and try and avoid future crises. It recognizes that the recent crisis was caused not by derivatives or complex financial products but because of a distinct lack of focus on the basics; the problem was not the securities invested in, but the enormous leverage the banks got themselves into. The renewed focus on high-quality capital and leverage is an admission by the Basel Committee that the risk weighted approach has proved to be insufficient. However it is ironic that on the path to Basel 3, the committee has fallen back on a methodology of yore. The current set of guidelines do nothing to reduce the external credit rating agency's currently enhanced systemic role nor have they really looked hard at their 'one size fits all' philosophy especially with regard to the emerging economies; the reforms for the same reasons can at best be termed Basel 2.5.

Whither Risk Management?

hile enough may have been said (though not yet done) about the great 'Lehman crisis of 2007-2009', it remains true that we are at a unique juncture in the history of world economics and markets. For risk managers, there is huge opportunity here. Indeed, good risk managers always pray for accidents - so that lessons can be carried forward and businesses in lop-sided pursuit of profits can perforce be paused to pay heed. And if anybody in India is still insisting that this problem was only a US one or even a US-created one, oh please, do feel free to send me an email to discuss! Or at least, do hold your breath!!

A) Risk Governance: Let us start with the Board of Directors

Boards of Directors (and executive management) at many institutions have failed in their risk responsibilities. It is time Boards become pro-actively committed to risk management. And it is time regulators focus keenly on risk governance in their analysis of the health of banks. And it is certainly time investors and shareholders and customers differentiate banks on this basis

So, with so many stakeholders looking over its shoulders, what's a Board to do?

- > Align practice with strategic objectives by issuing a statement of risk appetite. Risk appetite need not be all quantitative. And it is always both relative and dynamic. Boards must understand current business risks but also assess the changing marketplace and new risks.
- > Transparency is crucial. Actively disclose not only the firm's risk appetite to all stakeholders for critique and comment, but also the available risk architecture that reconciles this to the bottom-up business and risk management practices and output.
- > 'Stakeholders' necessarily includes the internal organization. Are all employees aware of the statement of risk appetite, can they find it, have they read it? Are all members of the staff able to articulate the parameters of their own risk responsibilities?
- > Define a meaningful relationship between the risk function and the Board. Equip and empower the CRO and the risk management organization, with clarity in culture, role, and accountabilities

B) The CRO of Tomorrow: Empowered, Equipped, and Engaged

The Chief Risk Officer is the individual (and leader of the function) that helps maintain operations within the dimensions of the firm's risk appetite. The CRO is talented and experienced of course. But critically, she ('he'?) understands that a pro-active approach with a commitment to value-added perspective creates a leadership role for risk, and a 'seat at the table'. We have to say adieu to the days of risk being a 'control' or a 'support' function or a 'let's just keep the regulators happy' strategy.

1. Vital to ensuring the CRO's inclusion at the governance level is that she

- i) Helps define and dimension the firm's risk appetite and tolerance/s
- ii) Creates the mechanisms to articulate and communicate risk appetite across the firm.

iii) Provides strategic perspective with direct communication to the Board and the CEO on markets, businesses and the legal-regulatory environment (and what is on the horizon) that impacts risk for the firm holistically. Specifically, she relates the growth and business of a firm to the evolution of its risk appetite.

- 2. Tactically, as the manager of an independent risk organization, the CRO implements its risk appetite and tolerance through an infrastructure of people, technology and dynamic communications across all stakeholders.
- 3. The fundamental role of the risk function is to oversee and continually test for "compatibilities" of a firm's risk-taking with
 - i. Its risk appetite (contextualized for the legal-regulatory environment)
 - ii. Products and markets through which risk is taken
 - iii. Returns for taking such risks

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Transparency is crucial. Actively disclose not only the firm's risk appetite to all stakeholders for ritique and comment, but also the available risk architecture that reconciles this to the bottoms-up business and risk management practices and output.

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The CRO lays down the principles, policies and practices that benchmark the business-as-usual and the "unusual, unintended, and unacceptable" risk-taking in the firm.

4. As custodian of risk appetite, the CRO dynamically redeploys the Economic Capital of the firm among various competing business units, and computes and compares risk-adjusted performances across the firm.

C) To VaR or not to VaR

In the late 1980s, financial markets began a transition into Risk Factor Sensitivities and Potential Loss Amount estimations, as alternatives to talking about Risk in notional amounts of various exposures. Senior management said well what does all that mean? How much could we lose? Enter VaR! And now a world with only types of people - loud VaR-haters and very quiet and docile VaR lovers! My position is clear: Some of my friends love VaR; some of my friends hate VaR. I agree with my friends !!

Strengths of VaR

- > Simple, with intuitive explanations as rough measure of how much a firm could lose e.g.
 - VaR (95% confidence, 1-day): actual losses should exceed this only once in 20 days
 - VaR (99%, 1-day horizon) : actual losses should only exceed this once in 100 days
- > Broad application across instruments and classes; relatively easy to calculate and to understand in terms of dollars, additive, like all dollars fungible. Life was good!

VaR Assumptions, weaknesses & misunderstandings

- > Tendency to assume Normal distributions, and thus low probability of 'extremes'. Reality is that financial returns are skewed excessively high and low return days are common;
- > There is often an assumption that history repeats itself, or, the past can predict the future;
- > Does NOT describe the worst case loss. All it estimates is the worst case for a specified probability. An interpretation of VaR is that LOSSES WILL EXCEED VaR, with probability equal to (1 VaR confidence level);
- > Does not distinguish portfolio liquidity; very different portfolios can have the same VaR i.e. VaR is a static measure of risk and does not capture the dynamics of possible losses if a portfolio were to be unwound;
- > Computations can be very complex; there is model risk;
- > VaR-constrained traders can game the system i.e. maximize risk subject to keeping VaR steady. The game repeats itself at several levels; and can trigger an avalanche, because everyone misjudges risk in the same way.

Risk professionals will always use the caveats listed above, and warn against assuming VaR as the worst-case, or even the advisability of relying on a simple number that is statistically generated.

D) Liquidity

Liquidity Risk remains the least developed of the Risk Management disciplines and the debate on whether Liquidity is more important than profitability or the other way around is a needless distraction.

- > We rarely talk about Liquidity Risk except in crisis situations (and the immediate aftermath) by when of course it is too late.
- > There is little or no common language or dimensions around Liquidity, both of the Funding type and of the Trading/Transactional type.
- > Liquidity projections and exercises typically continue to focus on 'contractual maturities' of assets and liabilities instead of superimposing views

based on 'behavioral-maturities' and 'stress-maturities'.

Most models assume that markets fully absorb all required trades with unchanged small spreads, whereas at the margin there is limiting absorption of trades, spreads can widen significantly, and in a crisis we may be seeing a complete lack of liquidity i.e. Liquidity can be binary either there, or not at all.

The perception of Liquidity, as we know, is as important as the reality of liquidity. Systemic risk itself is significantly about liquidity. And I argue that Liquidity Risk may well be the silo-breaker between risks - is it not true that when Liquidity disappears, Credit Risk and Market Risk are the same thing?

I like stress-testing exercises that include strong considerations of Liquidity crisis, whether at the level of the specific institution or the market as a whole. I like considerations of cumulative outflows, and varying defeasance assumptions (holding periods) and I like the LVAR focus on widening spreads. What I am still looking for is a holistic approach to Liquidity Risk in the risk community, clear language and dimensions and metrics, explicit recognition of the role of committed liquidity facilities, and of course regulatory recognition of Liquidity in the context of systemic risk and leverage and capital adequacy.

Summary thoughts:

Thoughtful risk based decisions can play key role going forward

Risk Communication

- Boards of Directors need to be qualified and informed about risk & risk appetite
- > Risk processes need to be proactive versus reactive
- > Risk culture and assessment benchmarks need to drive performance

Risk Measurement

- > Risk models must incorporate realistic assumptions
- > Time is nigh to understand liquidity and correlation risk
- VAR is good, and bad; we need radical reinforcement of meaning and use

Risk Mitigation

- > Risk concentrations need focus and join-the-dots intelligence
- > Hedges must be viewed in portfolio context
- > Dramatically upgraded practical usage of stress testing and what-ifs

A Culture of Risk Awareness: top-down, articulation, education and this is where the Global Association of Risk Professionals (GARP) has committed itself to; visit www.garp.org to know more.



About the Author

Jaidev Iyer, Managing Director, Global Association of Risk Professionals (GARP)

Jaidev Iyer is Managing Director at GARP, and a member of its senior management team. Jaidev came to GARP in January 2009, from a 28 year career at Citigroup where he most recently held the position of Global Head of Operational Risk for Citi's Institutional Clients Group (global capital markets & banking). In that capacity, Jaidev had also been a member of GARP's Board of Trustees for the last 4 years.

At GARP, Jaidev heads Marketing & Business Development globally; he is focused on putting into place an advocacy ("Voice of Risk Management") program for the Association, as well as identifying and developing relationships with organizations around the globe to assess their risk management programs, and developing partnerships within the financial services arena.

At Citigroup, Jaidev held a variety of key positions in multiple geographies and businesses. Roles prior to Operational Risk included Global Head of Risk Management for Asset Management, Head of Derivatives and Structured Products for Private Banking, Head of Market Risk for the Americas, Head of Middle East Treasury and Capital Markets, Head of Derivatives Financial Engineering for Asia, and Head of Market Risk for North Asia.

Jaidev's academic background is in Statistics and Economics. He also has a CFA charter, and executive management programs from the Kellogg School (Northwestern University) as well as the Kennedy School of Government (Harvard)

Review of Proposed Changes in Capital Calculation Market Risk for Trading Book

Against the background of the recent financial market turbulences, the efforts made by the regulators to increase capital requirements to cover market risks and additional risks in the trading book is justifiable. However, in the future, capital requirements should also be in line with risks assumed by the bank.



This paper summarises the key highlights of market risk capital calculation changes for trading book under Standardised Approach and Internal Models Approach (IMA). The paper refers to the '1996 amendment to Capital Accord to incorporate Market Risk' and for the proposed amendments it refers to two consultative papers by BCBS: 'Revision to Basel II Market Risk Framework' and 'Guidelines for Computing Capital for Incremental Risk in Trading Book'.

This paper draws its conclusion from independent views of the consultant, some industry expert judgements, and comments received on 'Revisions to the Basel II market risk framework' and 'Guidelines for computing capital for incremental risk in the trading book'.

Capital Calculation under Standardised Approach Snapshot

The main components of market risk for each asset class are specific risk and general risk. The specific risk attempts to capture the instrument specific risks, whereas, the general market risk attempts to cover the risk from the market movements.





- > Interest Rate Risk IR Risk is expressed in terms of two separately calculated charges, one applying to the "specific risk" of each security, whether it is a short or a long position, and the other to the interest rate risk in the portfolio, where long and short position can be offset based on the maturity or duration.
- > Equity Position Risk As with debt securities, the minimum capital standard for equities is expressed in terms of two separately calculated charges for the "specific risk" and "general risk". Specific risk is the eight percent value of the gross value of long and short positions, whereas, the general risk is the eight percent of the net value of long and short positions.
- Foreign Exchange Risk (including Gold)- The minimum capital standard for Forex positions is the maximum of sum of the net short positions or the sum of the net long positions, multiplied with a risk weight of eight percent. However, for gold, the minimum capital standard is the difference of sum of the net short positions and the sum of the net long positions, multiplied with a risk weight of eight percent.
- Commodity Risk Banks have an option to use either of the two approaches listed under Basel II: Maturity Ladder Approach and Simplified Approach. These approaches consider additional risks associated with the commodities portfolio, for example, Basis Risk, Interest Rate Risk and Forward Gap Risk.
- > Treatment for Options based on the size and positions in the options portfolio, the Bank has an option to use Simplified Approach, Delta-Plus Approach or Scenario Approach.

Amendments to Basel II Capital Requirement in Trading Book under Standardised Approach

Current economic and financial crisis has led the Basel Committee to come up with amendments to the capital assessment for Trading Book portfolios. Two consultative papers have been issued- 'Revision to Basel II Market Risk Framework' and 'Guidelines for Computing Capital for Incremental Risk in Trading Book', based on which, following key changes have been proposed under Standardised Approach:

- > To make the regulations au courant of the financial markets, the specific risk calculations have been explicitly stated for the correlation trading portfolio. The bank computes the total specific risk capital charges that would apply just to the net long positions from the net long correlation trading exposures combined, and the total specific risk capital charges that would apply just to the net short positions from the net short correlation trading exposures combined. The larger of these total amounts is then the specific risk capital charge for the correlation trading portfolio.
- > Applying banking book treatment to trading book for credit related instruments. The Committee has proposed copying the charges that are applied to securitisation (and re-securitisation) positions in the banking book to the trading book approach.
- > The treatment of specific risk amended to include specific risk rules for positions covered under the securitisation framework for market risk.
- > For the equity positions, capital charge for specific risk and general market risk will each be 8%, irrespective of whether the portfolio is both liquid and well-diversified. Earlier, the charge was a reduced 4%.

Impact of Amendments

Against the background of the most recent financial market turbulences, the efforts made by the regulatory authorities to increase capital requirements in order to cover market risks and additional risks in the trading book is justifiable. However, in the future, capital requirements should also be in line with risks assumed by the banks. The regulators, however, should have a stronger focus on the delineation of the trading and banking books.

Few specific impacts seen on the onset are discussed below:

- > The financial crisis has shown that although volatility has increased for almost all financial instruments, the risks for diversified portfolios are still significantly lower than those of an undiversified portfolio. Hence, the levy of flat 8% on capital requirements for specific risks of equities seems harsh and will only lead to increase in the capital requirements.
- Capital charges applied to securitisation exposures in the trading book will now align with the capital requirements of securitisation exposures in the banking book. As a result, specific market risk capital requirements will increase particularly for those exposures with a residual maturity of less than 24 months or those with a rating of A+ or lower. However, in the case of resecuritisation, the definition of the term "re-securitisation" and the increased risk weighting for resecuritisation correspond to those of the banking book and needs to be reassessed for the case of trading book.

Calculation of capital requirements under IMA

Under IMA, Value at Risk must be computed on a daily basis at 99 percentile, one tailed confidence interval with a 10 day holding period. The Bank has to meet capital requirement which is higher of (i) its previous day's value-at-risk number, and (ii) an average of the daily value-at-risk measures on each of the preceding sixty business days, multiplication factor.

General Market Risk Capital under IMA = Max (VaRprev. day, (Varavg. of last 60 trading days) x (Multiplication factor + additional factor)) Specific Risk Capital = Internally modelled or Standardised Approach based Incremental Risk Charge = No specific method (internally calculated or surcharge to specific risk)

Amendments to Capital Calculation for Trading Book under IMA

Basel committee has issued a consultative paper on guidelines for 'computing capital for incremental risk in trading book' and 'revision to Basel II market risk framework'. The paper provides amendments to the earlier proposed IMA in the wake of the recent financial debacle.



- > Incremental risk (IR) reflects the potential for losses sustained over the longer term due to credit default or credit migration. The paper proposes removal of the ability to measure incremental risk charge (IRC) by way of a surcharge to specific risk capital. Incremental risk should be calculated for issuer-specific losses at a 99.9% confidence level over the next year. The Committee expects banks to develop their own models for calculating the IRC for default and migration risks of unsecuritised credit products, taking into account:
 - . Liquidity horizons of individual positions or sets of positions
- . Correlations and diversification between defaults and migrations
- . Issuer and market concentration
- . Risk mitigation and diversification effects
- . Optionality in the portfolio
- > Specific market risk refers to the potential for losses sustained over the short term due to issuer specific factors. The bank is expected to internally model specific risk charge specifically for equity risk positions and interest risk positions (with the exception of securitisation exposures and nth-to-default credit derivatives) such that it captures all material components of price risk. The paper suggests to remove the calculation of specific risk using standardised approach.
- Banks must calculate a 'stressed value-at-risk' based on the 10-day, 99th percentile, one-tailed confidence interval value-at-risk measure of the current portfolio with value-at-risk model inputs calibrated to historical data from a twelve month period of significant financial stress relevant to the firm's portfolio. The capital requirement formula has been amended to include the stressed VaR component. I.e. higher of its latest available stressed-value-at-risk number and an average of the stressed value-at-risk numbers calculated over the preceding sixty business days, multiplied by the same multiplication factor as used for VaR but without taking the "additional factor". The paper further proposes to use 2007-2008 as the period of stressed VaR.
- > Banks have to satisfy the supervisors that the factors deemed relevant for pricing are included as risk factors in the value-at-risk model and that their VaR model captures nonlinearities for options and other relevant products and also the proxies that are used show a good track record for the actual position held.
 - Revised General Market Risk Capital under IMA = Max (VaRprev. day, (Ó VaRavg. for last 60 days / 60) x (Multiplication factor + additional factor)) + Max (sVaRprev. day, (Ó sVaRavg. last 60 days / 60) x (multiplication factor)
 - > (Specific Risk Capital Calculation = Internally modelled (No specific methodolgy)
 - > Incremental Risk Charge = Internally modelled (No specific methodolgy)

Impact of Amendments

A basic objective of the market risk framework should be to improve the linkage between a financial institution's capital requirements and its risk. This can only be ensured by accurate capture of the full set of risk factors that underlie their exposures, and calibration to a full range of market history that includes the most extreme scenarios. However, some of the proposed changes in the framework would effectively just scale up the capital requirements in current VaR models. Impact studies of the banking industry show that the proposed supervisory specifications for modelling incremental risks as well as the implementation of stressed-VaR result in an enormous increase in the capital requirements for the trading book regardless of the portfolio. This multiplication of the capital requirements has side effects. In fact, the capital-based incentive for the transition from the standardised approach for market risk to the internal models based approach vanishes due to the increasing capital requirements for the latter method. This represents a negative incentive for the further internal development and supervisory use of risk models. Few specific observations are as follows:

- > Incentives may be created not to assign and manage risk items in the trading book any longer, but to allocate them as far as possible to the banking book. The understandable desire of the supervisory authorities to avoid arbitrage opportunities in favour of the trading book has resulted in the creation of arbitrage opportunities in favour of the banking book.
- > The consultation paper strengthens the importance of stress tests for internal controls and regulatory monitoring, which is justified in our opinion. However, the selection of the relevant stress tests can be problematic. Only ex-post scenarios are applied for the stress test procedure and the determination of the stress VaR. The period of 2007/2008 may not be a relevant period for stress for all portfolios because of following reasons:
 - . Nature of portfolio
 - The macroeconomic factors in that period may not be at their worst case scenario, say, interest rates had peaked in 2003 and not in 2007/2008.
 - . The period may loose its importance in the ever evolving financial market in near future.
- > This makes it clear that any period, even when carefully selected, can only be of limited significance. At the same time, the question about "the" scenario cannot be answered. For this reason, a measured form of stress testing suitable for internal control should be applied to a range of scenarios. In doing so, all risk factors with their specific effect on stress for a portfolio and the stress potential from overall crisis situations should be taken into account. To make the capital requirements more aligned to the risk measurements, and ensure sustainability in the future forward looking scenarios should be designed on the basis of historical experience in order to survive in new market constellations.
- According to the specifications for determining the stressed VaR, only the qualitative add-on factor "x" and not the back-testing add-on factor "y" is to be taken into account for the multiplier. The justification for the factor 3(+x+y) in the conventional market risk VaR as a factor for any existing model errors or model shortcomings cannot be applied to the concept of the stressed VaR. If one views the stressed VaR as a further add-on for model shortcomings, the factor 3 appears unmotivated at the model level as a further conservative appraisal for the VaR already determined under stress.
- > The proposal would require that capital for all securitized products must be based on the standardized charge. This presumably includes not only securitizations of consumer receivables (e.g., ABS on mortgages or credit card receivables), but also correlation books, i.e., CDO tranches of corporate CDS which can be a tad restrictive in its nature. With the development of the index tranche market, the preponderance of the risks in correlation books can now be benchmarked to liquid market prices.
- No clear rules have been laid down for modelling of IRC. It will be at the firms' discretion whether to directly model rating transitions or use a model for credit spreads that produces similar levels of volatility. Moreover, by design, the proposed rules would not allow for diversification between market variables and the risk drivers of IRC. These relationships are ingredients to an IRC calculation where the exposure to default or migration can depend on the behaviour of market variables. The removal of all securitisation positions from the calculation of the IR capital requirements may be fatal.

Conclusion

Lately, the banking industry has already undertaken extensive efforts in large parts of internal risk management to deal appropriately with the causes and effects of the financial market crisis. Definitely, adjustments tailored to the situation of an institution offer significant advantages over a blanket increase in capital requirements ordered by a supervisory

authority. More importantly, a synchronised balance between the models used internally by banks in future and the regulatory requirements ("use test") should be ensured. The (further) development of models must not be restricted by rigid regulatory requirements, particularly in the area of measuring incremental risks, for which no market standards currently exist. Banks prefer to implement risk models, as these are more flexible and appropriate for their individual risk profile and portfolio configuration. With inflexible regulatory model requirements, which are primarily conservative in nature, the advantages of an internal model will be lost. The incentive of risk control on the basis of a bank-specific model would therefore be significantly reduced. Hence, a detailed impact study must be conducted before implementation of the new regulations.

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With inflexible regulatory model requirements, which are primarily conservative in nature, the advantages of an internal model will be lost. The incentive of risk control on the basis of a bank specific model would therefore be significantly reduced. Hence, a detailed impact study must be conducted before implementation of the new regulations.

Stress-Testing, Risk Appetite & Risk Capital Management



Stress testing - regulatory requirements and current practices; Risk appetite and risk capital requirements; and Incorporating stress testing results into risk capital measurement.

Stress Testing - Regulatory Requirements and Current Practices

The Basel II Accord document is peppered throughout with references to stress testing the risk capital requirements to ensure that a bank's activities are supported by adequate risk capital – especially during stressed economic times. The stress tests are meant to be comprehensive in their coverage so that the impact of changes in all risk factors and parameters on risk capital requirements can be captured – particularly, if large shocks such as those during the recent and continuing credit crisis occur in the economy causing significant losses.

Findings from a 2005 Basel Committee survey of large banks show that prior to the credit crisis, banks typically did not have enterprise-level stress testing programmes in place. Stress tests, when conducted, were carried out independently for particular risks, for individual business lines in isolation and seldom accounted for interactions among these risks and business lines; they did not always provide a view of the impact on the enterprise as a whole.

Further, the frameworks employed for stress testing did not have the flexibility to quickly devise new scenarios and determine their impact on risk and risk capital under the volatile and rapidly changing economic conditions. The stress tests themselves typically only accounted for changes in individual sources of risk, failed to account for extreme changes in them, and did not account for the impact of

any interactions across these risk sources.

Most significantly, the results of stress tests were usually not incorporated into the planning process for overall risk and risk capital measurement and management. The results were treated as merely interesting information with the overall attitude that the stress scenarios were not at all likely to be realized. Thus, no need was felt to plan for such outcomes – especially since doing so required additional risk capital outlays.

This fact contributed to the serious shortfall in banks' risk capital in a major way when the extreme stresses were experienced in the credit environment - starting with and during the credit crisis. Consequently, regulators had to devise ways to shore up the banks in serious distress. In the U.S. the Federal Reserve asked for, albeit on a one-time basis, stress tests to be carried out by banks that were stringent in their scenario specifications. Banks were then required to provide details of how much additional capital would be required, how and by when banks proposed to raise that much capital, and were prescribed what the resulting capital composition (e.g., Tier 1) was required to be.

The credit crisis has made it clear – for banks as much as for regulators – that the capital requirements need to account for, explicitly, extreme stress scenarios. It is not enough to just carry out stress tests and to merely have a sense of how much capital shortfall could occur if the economy were to experience some shock. Banks must actually put aside a cushion in their capital base to absorb these shocks; else the regulators, and eventually the taxpayers and the society will bear the burden as was demonstrated by this crisis.

To this end, Basel committee has put out a set of 21 principles to govern stress testing practices in banks and their supervision by the regulators. Fifteen of these 21 principles pertain to specification of how banks may set up and carry out stress tests and incorporate their results in the actual risk capital determination; the rest pertain to regulatory supervision of stress testing programmes.



For Market Risk, in particular, the revised 2009 Basel II framework explicitly specifies a stressed VaR capital charge (Figure 1).

For credit risk, although there is no explicit formula-based specification for additional capital based on stress tests, the requirements to account for all those risks not covered under Pillar 1 – and to do so under stress

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Clearly, a bank that finds itself in a situation where the market risk capital charge including that for Stressed Var exceeds its appetite for market risk capital will initiate a rebalancing process for the trading book portfolio. This will be necessary to ensure that the market risk capital requirement is matched to its appetite for market risk.

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conditions - have been strengthened considerably under Pillar 2 ICAAP specifications. In particular, extreme stress events including those resulting in highly diminished liquidity – and thus heightened credit risk – must now be examined for their impact on risk capital.

Risk Appetite and Risk Capital Requirements

Risk appetite is specified as the "acceptable" level of Capital-at-Risk (CaR) - a statistical measure of the resources required to absorb unexpected losses over a pre-specified period (typically one year) at a pre-specified confidence level. For example, if CAR confidence level is set at 99% over a one-year planning horizon, then the bank has deemed it acceptable that 99 chances out of 100 the capital will cover its unexpected losses over the year, and that one out of 100 chances its losses will exceed the capital set aside.

A higher confidence level setting for CaR implies that a larger economic capital buffer is being set by the bank to absorb higher unexpected losses. In the extreme event of unexpected losses being actually realized over the year that equal CaR, the shareholder equity in the balance sheet will be reduced by the amount of CaR. In the event that the unexpected losses actually exceed CaR, the need for raising additional capital arises – as has been demonstrated so lucidly by the crisis.

Ascertaining the risk appetite at a bank requires formulation of future scenarios for the enterprise and determining overall potential losses in each of these scenarios. The resulting loss distribution is then utilized for setting the acceptable confidence level and CaR.

Incorporating Stress Test Results into Risk Appetite

Measurement

Up to now, most banks have typically not incorporated results of stress tests in the processes for their overall risk appetite determination. With the regulatory requirement noted above for explicit inclusion of Stressed VaR for market risk capital charge, a start has been made for all banks to do so – at least for one component of the overall risk capital charge.

Clearly, a bank that finds itself in a situation where the market risk capital charge including that for Stressed Var exceeds its appetite for market risk capital will initiate a rebalancing process for the trading book portfolio. This will be necessary to ensure that the market risk capital requirement is matched to its appetite for market risk.

Similar rebalancing will eventually take place in other parts of the overall bank portfolios in order to align the risk capital requirements with the risk appetite that reflects the possibility of extreme risk scenarios being realized. Widely-accepted industry-standard models and processes – with regulatory approval and/or blessing – do not yet exist for other risk types such as credit risk, operational risk, business risk etc.. Reasonable approximations are still available – say, based on impact of stress scenarios on overall regulatory capital – that can be employed in the meantime to incorporate the results of stress tests on risk capital requirements. The Basel II Pillar 2 ICAAP framework is the ideal vehicle for banks to explore these internally and also for communicating with the regulators the overall stressed risk capital requirements.

References

- ¹ BCBS, "International Convergence of Capital Measurement and Capital Standards A Revised Framework Comprehensive Version", June 2006.
- ² Basel Committee on the Global Financial System, "Stress testing at major financial institutions: survey results and practice", CGFS Publications No 24, January 2005. The Board of Governors of the Federal
- ³Reserve System, "The Supervisory Capital assessment Program: Overview of Results", May 7, 2009.
- ⁴ BCBS publication "Principles for sound stress testing practices and supervision", May 2009.
- $^{\rm 5}$ BCBS publication "Revision to the Basel II market risk framework final revision, July 2009
- ⁶ We use the words CaR and economic capital interchangeably in this discussion.



About the Author

Savita Verma is currently a member of the Economic Capital Methodology group at RBC Capital Markets, Toronto Canada. Her risk management expertise includes both market and credit risk, and risk capital management. With more than 20 years of experience, Savita has heldroles including Director, Capital Analytics at Algorithmics, Head of product management, financial engineering and research at Misys, Vice President of Credit and Risk Management Analytics at ScotiaBank, senior financial engineer and manager of applied research at Algorithmics, and Assistant Professor of Finance at the Schulich School of Business at York University, Toronto.

She has authored and co-authored articles and books on finance. Savita has a Ph.D. in Business Administration (Finance) from the University of British Columbia, Canada, and a Ph.D. in Mathematics from the Indian Institute of Technology in Kanpur, India.

Regulatory Update

Committee of European Banking Supervisors (CEBS)

Management Of Operational Risk In Market-Related Activities 21st December, 2009

The Committee of European Banking Supervisors (CEBS)



Governance mechanisms Internal controls Internal reporting systems

The complete paper can be found at (http://www.c-ebs.org/Publications/Consultation-Papers/Allconsultations/CP31CP40/CP35.aspx).

International Framework for Liquidity Risk Measurement, Standards and Monitoring 17th December, 2009

The Basel Committee on Banking Supervision has issued for consultation, a package of proposals to strengthen global capital and liquidity regulations with the goal of promoting a more resilient banking sector. This document discusses the two measures of liquidity risk exposure developed to formerly-adopted standards for internationally active banking organizations, a common monitoring tool to be used by supervisors and application issues for the standards and monitoring tools.

Complete proposal can be found at (http://www.bis.org/publ/bcbs165.htm)

Strengthening the Resilience of the Banking Sector 17th December, 2009

The Basel Committee on Banking Supervision issued for consultation, a package of proposals to strengthen global capital and liquidity regulations with the goal of promoting a more resilient banking sector. The key elements of the proposals the Committee is issuing for consultation include, raising the quality of capital base, strengthening the risk coverage of the capital framework, introducing leverage ratio as supplementary measure to Pillar I capital calculations and introducing a series of measures to promote the build-up of capital buffers. Complete details can be found at (http://www.bis.org/publ/bcbs164.htm)

The Financial Services Authority (FSA) has strengthened its stress testing regime by requiring firms to improve their stress

testing capability, enhance their capital planning stress testing and by introducing a reverse stress testing requirement for firms.

Guidelines on Stress Testing 14th December, 2009

The CEBS published the draft of its revised Guidelines on stress testing for consultation. The consultation is open to all interested parties, including supervised institutions and other market participants. The revised guidelines update the Guidelines on Technical Aspects of Stress Testing under the Supervisory Review Process that were published on 14 December 2006 and complement the principles set out in the CEBS's Guidelines on the



Application of Supervisory

Review Process under Pillar 2. The complete paper can be found at (http://www.c-ebs.org/Publications/Consultation-Papers/All -consultations/CP31CP40/CP32.aspx)

Guidelines on Concentration Risk 11th December, 2009

CEBS published its draft revised guidelines on aspects of the management of concentration risk under the supervisory review process. The draft revised guidelines update the Guidelines on technical aspects of the management of concentration risk under the supervisory review process published on 14 December 2006 and complement the principles set out in the CEBS's Guidelines on the application of the supervisory review process (GL03). Building upon the lessons drawn from the financial crisis, CEBS's draft revised guidelines follow a holistic approach which aims at ensuring sound overall concentration risk management, meaning that institutions are expected to identify and assess all aspects of concentration risk, moving further away from the traditional analysis related only to credit risk.

The complete paper can be found at (http://www.c-ebs.org/Publications/Consultation-Papers/All-consultations/CP31CP40/CP31.aspx)

Financial Services Authority (FSA)

Stress Testing 11 December, 2009

The Financial Services Authority (FSA) has strengthened its stress testing regime by requiring firms to improve their stress testing capability, enhance their capital planning stress testing and by introducing a reverse stress testing requirement for firms. Complete guidelines can be found at

(http://www.fsa.gov.uk/pages/Library/Policy/Policy/2009/09_20.shtml)

Capital Planning Buffer 11 December, 2009

FSA published a short consultation paper clarifying its approach to capital planning buffers (CPB). The FSA is consulting on simplifying its approach and has provided further clarity about expectations on the use of the CPB and the mechanism by which firms can draw down the buffer. This is an initial step in improving firms' capital ahead of international discussions which will take place in 2010.

Complete paper can be found at (http://www.fsa.gov.uk/pages/Library/Policy/CP/2009/09_30.shtml)

Strengthening Capital Standards 3 10th December, 2009

The FSA published consultation paper (CP 09/29) 'Strengthening Capital Standards', which contains proposals for the implementation of changes to the European Capital Requirements Directive (CRD). The proposals cover a diverse range of topics including: hybrid capital, large exposures, securitization, the trading book, Pillar 3 disclosures and regulatory reporting.

Complete paper can be found at http://www.fsa.gov.uk/pages/Library/Policy/CP/2009/09_29.shtml Liquidity Regulation

05 October, 2009

The Financial Services Authority (FSA) has today published its final rules on the liquidity requirements expected of firms. The far-reaching overhaul, designed to enhance firms' liquidity risk management practices is based on the lessons learned since the start of the credit crisis in 2007. The new rules will require changes to firms' business models and will bring about substantial long-term benefits to the competitiveness of the UK financial services sector.

 $Complete guidelines can be found at http://www.fsa.gov.uk/pages/Library/Policy/2009/09_16.shtml and the state of the sta$

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