INSURANCE OF OPERATIONAL RISK
UNDER THE NEW BASEL CAPITAL ACCORD

A Working Paper submitted by Insurance Companies
November 7, 2001

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This paper provides recommendations and guidance for the explicit recognition of insurance as a risk mitigant for operational risks of banks within the capital framework of the new Basel Capital Accord (the New Accord). In its Working Paper published in September 2001 (Working Paper)[1] and the Consultative Document of January 2001[2], the Basel Committee on Banking Supervision (the Committee) acknowledged the role of insurance as a risk mitigant for operational risks and introduced the potential for explicit recognition of insurance within the Pillar 1 minimum capital requirements. In response to this suggestion, members of the insurance industry joined together to form a working group to explore and address the issues surrounding the use and impact of insurance and to develop possible approaches to measuring its risk reduction value and appropriately calculating the associated capital relief.[3] This paper will present the work completed by this group to date.

The underlying premise of this paper is as follows:

> *Insurance is an effective tool for mitigating operational risks by reducing the economic impact of operational losses, and therefore should have explicit recognition within the new capital framework to appropriately reflect the risk profile of the institution and encourage prudent and sound risk management.*

This paper is divided into three sections. The first section approaches the definition and classification of operational risk, matches this to existing insurance products commonly purchased by banks, and discusses critical issues to data collection. The second section discusses specific topics related to issues of insurance as a risk mitigant, specifically focusing on certain items mentioned in the September Working Paper. Finally, the last section will present various alternative methods for including insurance in each of the approaches to calculating capital requirements.

An executive summary of the key points of this paper:

1. The New Accord should recognize standard, commonly purchased insurance contracts[4] as well as more comprehensive alternative forms of risk transfer. Recognition of these contracts should be subject to certain minimum qualifying criteria and the resulting capital treatment should reflect an appropriate degree of reduction corresponding to the terms of such contracts.

2. The explicit recognition of insurance should be applicable under each of the continuum of Approaches available to banks (Basic, Standardised, and AMA Approaches) in order to appropriately reflect the varying use of insurance and its impact on individual risk profiles.

3. The Approaches to capital relief for insurance should mirror the objectives of the Committee and support the evolutionary concepts of increased risk sensitivity, flexibility,

---

[1] *Working Paper on the Regulatory Treatment of Operational Risk*, Basel Committee on Banking Supervision (September 2001).
[2] *Consultative Document Operational Risk, Supporting Document to the New Basel Capital Accord, Basel Committee on Banking Supervision*, (January 2001).
[3] Annex 1 provides a list of companies supporting this paper.
[4] See suggested list of coverages and descriptions in Annex 4.

and robustness. Additionally, recognition under the Basic and Standardised Approaches should be limited relative to the AMA Approaches to reinforce incentives for banks to progress to the more advanced approaches.

4. The 75% floor applicable to the AMA Approaches, as suggested by the Committee in the September 2001 Working Paper, should not be inclusive of insurance benefits but rather be based on the result of the gross calculation before insurance. A separate specific floor should be imposed upon insurance and be incorporated within each of the approaches to the calculation for the capital relief.

5. Certain residual risks should be appropriately accounted for within the framework of the capital treatment, such as counterparty risk, scope of coverage, and timing of insurance payment.

6. A standardized, comprehensive approach to data collection is a critical component for measuring and managing operational risks as well as expanding and improving the market of insurance products for operational risk.

We look forward to the Committee's response to this paper in due course.

1. DEFINITION, TAXONOMY, DATA, AND MAPPING OF INSURANCE

Introduction

In order to determine an insurance offset to the required capital charge for operational risk, it is first necessary to consider the definition and scope of operational risk. Once defined, an organised description of operational risk can be categorized by way of a multi-tiered structure or taxonomy.

This taxonomy provides the framework under which the operational risk capital charge will be determined and can provide the initial guidance in how to determine the risk reduction provided by insurance and the calculation of an appropriate offset to recognize the resulting risk profile. The taxonomy also provides for a method to align the way insurance responds to operational risk through its various coverage options.

In this section, we first review the definition as stated by the Committee. Then we consider the structure of this definition in the form of an organizational array and offer suggestions on some refinements to the structure. A discussion on data collection is provided and a list of data quality standards is proposed which advances a mapping of how insurance products tend to respond within this tiered operational risk diagram. This in turn leads to the concluding portion on the capital treatment of insurance that offers a series of alternative methodologies detailing a progressive approach to determining the capital relief for insurance.

As will be noted, the process design developed here recognises the significant work done by the Committee, and banking industry working groups on operational risk (ITWG[5] and EFIRM[6]). The process relies heavily on the work done to date and assumes that much of the definitional work undertaken by the banking community will likely remain substantially unchanged. Further, since the insurance offset component must be compatible with the overall operational risk charge determination, it is necessary to fundamentally follow the spirit of the design work to date.

Definition of Operational Risk

For the purposes of operational risk measurement and quantification, it is important to work with a discrete definition that is narrow and targeted. For these purposes, we accept the Committee's definition of operational risk:

> *"The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."*

However, with regard to the transparency of the proposed definition, further clarification of certain terms used in the supplementary explanation in the September 2001 Working Paper is needed to facilitate a common understanding of the scope of operational risk for regulatory purposes. The Working Paper states that "strategic and reputational risks" are not included, and the capital charge does not intend to cover "all indirect loss or opportunity costs". It further specifies that the definition does not include "systemic risk".[7] Although there has not yet been a proposal for robust and conclusive definitions of these terms, we believe it would be valuable for the Committee to define these supplementary terms to fully comprehend the definition of Operational Risk.

---

[5] Industry Technical Working Group on Operational Risk
[6] European Financial Institutions Risk Managers
[7] See page 2, "Definition of Operational Risk", *Working Paper on the Regulatory Treatment of Operational Risk*, Basel Committee on Banking Supervision (September 2001).

We reference the following definition of Business Risk from EFIRM:

> *"Business risk is the potential not to meet the strategic objectives, as set out in the annual operating plan, caused by risk other than operational, credit or market risks. Examples of business risks are unforeseen changes in the business environment, exposure to economic cycles and technological change, investment in appropriate IT, insufficient organisational structure or workflow, faulty or false recruitment standards and decisions."*

We recommend that the terms "indirect loss" and "opportunity cost" be re-named to "loss of income" and "increase in cost of working" respectively. Indirect loss, although widely used, does not have decisive definition and may elicit different interpretations. Opportunity cost is a jargon of economics and is conceptual rather than specific.

The definition cited notes four distinct causal factors of operational risk. An improved understanding of the scope of operational risk is developed below through a defined taxonomy that relies upon and builds from these four causes. Given a well defined and logical taxonomy or classification scheme, information and data regarding operational risk can be developed, assembled and ultimately evaluated.

Taxonomy of Operational Risk

To begin examining a taxonomy for operational risk, it is necessary and prudent to review and relate to the work completed to date by the Committee. We make this comment because it will be necessary for any insurance offset to be determined in a manner that is compatible with the way the overall operational risk capital amount is determined. In review, we note that the Advanced Measurement Approaches (AMA) develop the capital risk charge through a process that recognises a matrix of loss events and business types. In particular, it is the loss event descriptions that amplify on the meaning of operational risk. The multi-level approach of the loss events as described in Annex 2 of the Working Paper provides clearer guidance on how operational risk is envisioned.

Therefore we begin our considerations with the acceptance of the definition for operational risk and recognition of the working taxonomy set forth in the September 2001 Working Paper[8]. From this starting point, we offer an enhanced view for the taxonomy of operational risk shown on Annex 1.

This modified taxonomy follows most of the design of the Committee's structure, but it attempts to adjust it in three ways:

1) First, the proposal attempts to align the multi-level loss event descriptions to the four primary causal factors noted in the definition (people, processes, systems, and external events). We believe that this adds a crisper design of the taxonomy that flows logically from the causal based definition. An initial level category is added to indicate the causal basis along with a suggested definition for each of the primary causes. Within this framework, the Committee's seven level 1 event types are fully preserved, although some labelling changes are suggested in certain cases.

2) The second enhancement that we offer is to include additional activity examples for level 3 categories to make the taxonomy more robust and complete and expanded the level 2 design in order to provide some additional clarity within the structure. Of note in level 2, an additional Computer Crime category is added within the Internal Acts section since computer crime can

---

[8] Annex 2,

originate from both internal and external sources. Also, we expanded Damage to Loss of Assets category at level 2 to allow for a segregation of loss events related to Physical Asset Damage and political risks.

3) Finally, we added a column to indicate whether each activity example may fall under the definition of Business Risk.

A notes page outlining each of the differences between this design and the one defined by the Committee is provided in Annex 2.

For the most part, we believe that the taxonomy proposed is highly compatible with the Committee's working design for loss events. Our proposal used the work of EFIRM and ITWG as a basis and we suggest that any remaining discrepancies be discussed jointly among the various banking and insurance working groups and supervisors.

We believe that such a design can be used in the considerations required for determining the insurance offset to the operational risk capital charge. We also recognize there may be changes to the way the operational risk taxonomy is viewed over time, and we are prepared to be flexible in our recognition of future enhancements.

Mapping Insurance within the Operational Risk Taxonomy

This section demonstrates the connection between insurance and operational risk through a visual representation of the coverages provided by standard insurance policies matched to the universe of operational risk loss event taxonomy.

As mentioned in the Working Paper, insurance has long been an effective measure to protect banks against operational risk losses. The insurance industry has closely aligned itself to the risk management of banks and support their efforts by providing long-term, stable and tailored insurance coverages. The bankers blanket bond widely sold to banks today, for example, has an extensive history of protecting banks against certain operational risks. Electronic insurance, on the other hand, which covers internet-related risks, is a recently developed product that emerged in response to banks' expanding use of internet-based transactions.

Although the risk mitigating role of insurance has been noted in the financial industry, it can be difficult to visualize and recognize its role due to its perceived complexity. The perceived complexity includes existence of various tailored coverages (policy wordings) and segregated product offerings. Traditional insurance products typically are designed to cover a clearly defined specific set of risks based on the cause of loss. Although individually, these risks do not cover the entire range of operational risks, the mapping of these products demonstrates that collectively they cover almost every single loss event type identified by the Committee. To further deepen the comprehension of insurance and the recognition of its role among regulators and the banking industry, we believe it is important and necessary to demonstrate how and where insurance works in the context of the regulatory definition and classification scheme of operational risk. For this reason, we have mapped conventional insurance products within the operational risk taxonomy (see Annex 3).

This detailed mapping exercise begins to provide a clearer picture of the coverages provided by current standard insurance product offerings in relation to the spectrum of operational risk loss events. A description of the standard insurance policies used in the mapping provided in Annex 4.

In addition, it should be noted that the insurance mapping indicates the following two important points that would facilitate comprehension of these insurance products:

- Standard insurance products have been developed as a response to evolving needs of clients and market forces, and are maintained by competitive pressures , and

- The mapping of insurance products exercise is flexible to adjust itself to reshuffling of any level of categorization.

Data Collection

We welcome that the Committee has made clear the distinction between operational risk causes, actual measurable events and the profit and loss effects to assess the mechanism of loss occurrence. We support the Committee's overall shift to an events based approach rather than effect based approach in the categorization and collection of operational risk loss data. Sophistication of the operational risk management is an important issue for any financial institution.

In order to implement effective risk management policies, including decisions about prudent use of insurance and to avoid or mitigate future occurrences of operational risk events, analyses of internal/external loss databases provide concrete and valuable feedback. In particular, analyses of the causes of specific events provide the necessary qualitative feedback on steps that can be taken to avoid future manifestations of the problem. These are important for credible modeling efforts or regulatory monitoring exercises under Pillar 2. Unlike market and credit risk, operational risks are not homogenous. To obtain credible knowledge of these phenomena therefore requires careful establishment of appropriate data structures, in depth modeling and analysis of the collected data, and prudent judgement.

The specifications of data currently proposed in the QIS 2 does not provide enough granularity to achieve these qualitative objectives. Additional steps in terms of detail and specificity will significantly improve the result both from a qualitative and quantitative aspect on operational risk. We urge supervisors to ensure that the data collection regime proposed is sufficiently sophisticated and effective, as the difficulties to remedy defects at a later stage will be substantial.

In order to enable all involved parties the best possible benefit of the collected data, we suggest an increased focus on the development of solid industry-wide data collection standards. These standards should ensure not only the quality of collected data, but also the compatibility with the QIS 2 data, internal databases and any other external database. The insurance industry has extensive experience in managing this kind of data and is willing and ready to provide assistance to the banking industry. We recently started a dialogue with several banks and banking groups to offer our assistance with this effort. Collaboration between banks and insurers to create a joint, standardized data collection effort (in accordance with applicable antitrust regulations) may enhance the quality and breadth of data.

It is suggested that each loss event being recorded migrate into the 56 cells proposed by the Committee (i.e. the seven business lines and eight loss event types) or similar standardized structure for capital calculation purposes. Enhancing the data beyond the loss amount and some other basic information in each of the suggested 56 cells is needed in order to provide sufficient information to analyze qualitative aspects of the operational risk and implement any preventive measures.

Besides the basic structure of the proposed database, we would like to recommend the inclusion of further fields that are necessary to use data to its fullest potential. In that respect, the data collection methodology needs to achieve a balance between detail and practical simplicity in its application. Therefore we suggest a two-stage approach such that (1) a minimum set of information is gathered for every loss event above a minimum threshold (e.g. $10,000 in QIS 2), and (2) additional information fields are gathered for events above a second threshold representing unexpected losses. At this second level, an individual analysis of the event grants relevant feedback to the risk management process.

The following is an example of the possible required data fields for each level:

Level 1 – Minimum Threshold
- Gross loss
- Net loss
- Currency
- Country of occurrence
- Date of occurrence
- Event Type / Risk Category (RC) (at least level 2)
- Business Line (BL) (the combination of RC's and BL's is also referred to as Risk Segments (RS) or the "taxonomy")
- Loss Effect type (LE)

Level 2 – Unexpected Loss Threshold
- Event Type / Risk Category (more detailed, level 3 or additional levels)
- Causative/ Contributory factor(s) (see explanation below) (CC)
- Product/ Process/ Function type (see explanation below) (PP)
- Type of insurance coverage / Relief Type (RT) applicable (e.g. bankers blanket bond, property, etc.)
- Date of discovery
- Date of insurance recovery
- Status of loss (open/ closed)
- Value of Exposure Indicators at time of loss (e.g. gross income, assets managed) (EI)
- Value of Relief Indicators at time of loss (e.g. insurance premium, limits, deductibles) (RI)

Comments/ explanations:

1. We recommend a field to reflect the country where the loss occurred. Calibration of the severity of probable losses for modeling purposes should incorporate, for example, the differences between jurisdictions.

2. The implementation of a causative/contributory factor field (CC) associated to the event type (RC) field allows for both top-level searching and granularity, (e.g. lack of control, lack of proper segregation). Proper and appropriately detailed indexing allows the cause of any given event to be pinpointed and analyzed for purposes of "lessons learned."

3. For further specification of the basic BL-structure we suggest either (a) further break down of this dimension, or (b) establish an additional field associated hereto (analog to the CC field associated to the RC field). Henceforth, this dimension could be further broken down into and enriched by the following: data of Corporate Entity/ Unit Types, offered products and/or services (Service/ Product Offering Types e.g. derivatives, futures, retail business), specific processes or functions (Business Process/ Function Types e.g. infrastructure, IT) or "objects" (Corporate Asset Types e.g. ATM-machine, physical structures). This breakdown should be linked to the Event Types / RC's that senseless combinations or combinations without further "information value" are allowed or generated.

We have provided specific suggestions for a two-level system of complementary data fields that would contribute to a development of qualitative risk management policies. We believe these examples provide guidance on how to create data standards that are flexible and allow for both a generic and a granular approach.

Ultimately, regulators have the opportunity to determine a data standard that:

• will work for a variety of organizations, organizational structures, and products,

• ensure the optimum of sound quality information for the avoidance of future losses,

• ensure the understanding of causative factors which have lead to risk,

• provide the necessary data foundation for the identification and monitoring of operational risk through key risk indicators,

• support the evolutionary process of operational risk in the future, and provide an optimum data set for the modeling of operational risk capital.

2. Insurance as a Risk Mitigant

Introduction

Insurance is a well-established risk management tool that has been used by the banking sector for many decades. There are a variety of insurance products that banks use to reduce the economic impact of operational risks from standardized, peril-specific insurance products with a long history to emerging alternative broad forms of risk transfer or tailor-made coverages. Insurance is a proven, effective technique for managing the financial consequences of unexpected losses. As such, it would support the Committee's objectives to explicitly recognize the use of insurance to improve the risk sensitivity of the measurement of required capital and to encourage prudent risk management throughout the banking industry. However, since insurance is not a "perfect hedge" for operational risk, it is important that the recognition appropriately consider the residual risks associated with insurance. We recommend a two step process for this. First, the New Accord should specify a set of minimum criteria for a contract to qualify as an operational risk mitigant, and second, the methodology for capital treatment should account for the associated residual risks of the qualifying contracts. This process will allow for recognition of standardized traditional insurance products while supporting the development of broader alternative forms of risk transfer for operational risks.

Breadth of Coverage

The most commonly purchased insurance contracts are in the form of standardized peril-specific policies such as bankers blanket bonds[9]. Clearly, these types of products are specifically focused on certain segments of operational risk. However, sometimes banks also blend several specific policies into a multi-peril, blanket-type coverage. Going even further, banks may have the opportunity to purchase broad coverage risk transfer that more closely mirrors the whole spectrum of operational risk. Recognition of insurance products under the New Accord, should take into account the varying breadth of coverage afforded by the risk transfer product. Therefore, we have included a factor in our recommendations under the Capital Treatment section of this paper, to appropriately consider this in determining the amount of capital relief afforded to qualifying contracts. These factors will be prescribed for standardized products based on a mapping of these policies to the definition and taxonomy of operational risk. The result is, the broader the coverage, the more capital relief.

Counterparty Risk

One concern expressed by the Committee in recent publications is the counterparty risk associated with transferring operational risks to an insurer. We recognize the element of credit risk embedded in the use of an insurance contract as a risk mitigation technique. We suggest that this risk can be addressed within the calculation of the capital requirement through the implementation of a haircut based on the credit quality of the insurer. The application of such a haircut will reduce the amount of capital relief associated with each insurance policy according to the level of counterparty risk assumed. We propose that the determination of the haircut mirror the basic elements of the Standardised Approach for Credit Risk such that the Committee would prescribe a table of haircuts according to supervisory approved ratings of the insurer's claims paying ability. The Committee may

---

[9] See Annex 4 for list and description of standard peril-specific coverages.

elect to set a minimum external assessment rating threshold based on the insurer of each insurance contract to qualify for capital relief.

For each qualifying contract, a haircut should be applied to recognize the counterparty risk embedded within that contract. Each of the methodologies presented in this paper incorporates such a haircut notated as CR_p. The value assigned to CR_p for all approaches can be determined by reference to a supervisory prescribed table representing the specified factor relative to each level of credit risk according to an external assessment[10] of the counterparty's claims paying ability. Such a table would look similar to the table of risk weights used in determining Credit Risk[11]. The Committee should prescribe the range of ratings and the corresponding values for the haircuts.

The applicable counterparty rating depends on the insurer of each policy. However, many times, particularly with large internationally active banks, an individual insurance policy will have multiple insurers participating either on a pro-rata or excess layered basis. The determination of CR_p on such programs should be the weighted average of CR_p for participating insurers relative to their share of the risk.

An elaboration on further details of credit risk is provided in Annex 5.

Reinsurance

Reinsurance is an important aspect of risk management employed by insurers and reinsurance strategies are a major factor in external agencies' assessments of an insurer's financial strength and claims paying ability. We would like to clarify that the insurer issuing the contract is directly and fully obligated to the insured within the agreed timeframes, regardless of ability or timing of any reinsurance recoverables. Therefore, the appropriate and applicable counterparty rating is that of the insurer(s) directly entering into the insurance policy with the banking institution.

Qualifying Criteria for Insurance Policies

When discussing capital relief to be provided by insurance products, we accept that regulators are looking for practicable ways of assigning appropriate values to insurance policies. As this is burden-some on a case by case basis, it is necessary to define minimum criteria under which insurance policies qualify.

Although traditional lines of insurance are generally standardized and share a common scope and intent of coverage, individual policies vary between insurers and between clients on certain specific points. There are also differences between countries and their legal systems that are reflected in differences of language and design of a policy. However, the standard insurance products enumerated in the coverage mapping section (Annex 4) share a common scope and intent of coverage that has developed over time and is held to similar client standards by competitive pressures.

---

[10] The eligibility criteria of external credit assessment institutions should be identical to those applied under the Standardised Approach for Credit Risk.
[11] As described in *Consultative Document The Standardised Approach to Credit Risk, Supporting Document to the New Basel Capital Accord*, Basle Committee on Banking Supervision (January 2001).

We propose the minimum criteria for policies to qualify under the New Accord include:

1. *Counterparty Credit Rating*: This is discussed separately in the credit risk section. Regulators will have to determine the minimum threshold.

2. *Contract Duration*: Minimum 12 month period. This is the standard for most insurance contracts as insurers typically take the opportunity to reassess the risk annually and price according to the development of the risk. Annual policy terms provide the opportunity for competitive market forces to operate and adjust contract terms and conditions. It is not uncommon for insurers and banks to negotiate longer terms such as two or three years. The Committee may want to consider affording more favorable treatment to such contracts in the form of larger capital offsets.

3. *Cancellation Period*: Minimum of 30 days, except for non-payment of insurance premium. Cancellation periods vary depending on the type of policy and the reason for cancellation. They are included within policies to protect the insured bank and the insurer equally. In general, cancellation periods within most policies are rarely less than 30 days. Larger insureds with more complex operations and more sophisticated insurance programs often negotiate cancellation periods upward to 60 or 90 days. Markets have been working with this timeframe without this leading to serious issues. The reason is the existence of competition where usually more insurance companies offer coverage than the client is prepared to accept. The cancellation cuts both ways and gives the banks the opportunity to market their risks quickly. Again, products that offer longer cancellation periods could qualify for higher relief. Though both parties have the right to cancel the policy, this is not exercised on either side without careful consideration or discretion. As a consequence, we do not consider this to be a critical risk.

Other Issues

The Committee has expressed questions or concerns related to the following additional topics as respects insurance as a risk mitigant. We offer the following discussion on such topics.

1. *Exclusions and Policy Conditions*. A residual risk of insurance contracts is the presence of exclusions and conditions that can cause a loss not to be paid by a particular insurance policy. We therefore go deeper into the rationale for the existence of exclusions. We wish to clarify that insurers do not use exclusions to escape from their responsibilities under the policies. Rather exclusions are used to specify the understanding of the intended and agreed to coverage for the policy.

   The purposes for exclusions include:
   - to define and shape coverage
   - to eliminate double insurance
   - to eliminate coverage which is not needed and not priced for
   - to eliminate uninsurable exposures
   - to eliminate moral hazard

Exclusions are already accounted for in the calculation for capital relief as outlined in the Capital Treatment section of this paper. The more exclusions to a policy, the less value it offers to the bank. The capital relief should be lower in such cases.

2. *Timeliness of Payments.* Claims settlement is a concern for regulators who discuss it under the heading of timeliness of payments. The above discussion has shown that there are good reasons for conditions and exclusions in insurance contracts. These need to be checked in case of a claim and the facts verified. Typically, a small percentage of claims are disputed and most are settled within a couple months after an adjustment of loss is completed. This settlement period is comparable to that of standard credit derivatives that take one or two months to settle after a contract is triggered. Delays in insurance payments are primarily attributable to the process of determining facts.

3. *Systemic risk.* This has been mentioned as an area where regulators are concerned about insurability. There is no exclusion with respect to systemic risk. This risk cannot be described with sufficient precision, unlike war, and it can have many causes. It is the responsibility of the individual insurer to address the financial consequences of systemic risk through monitoring risk accumulation in a certain product line or geographical territory as well as through reinsurance. The only exception is an exclusion for war, an event where the basis of traditional insurance underwriting does not function anymore, where the calculation of probabilities is relied upon.

In general, standard traditional insurance policies as they are currently offered would qualify for capital relief in an amount appropriate for the risk reduction. Specific products which offer enhanced coverage should qualify for greater relief and we offer to work out a framework which enables the attribution of capital relief through these products. We anticipate further dialogue with the Committee and an evolution of the process by which insurance contracts are qualified for capital relief.

We propose to establish working groups jointly with the banking industry to elaborate on parameters that can be applicable to the full range of insurance products.

3.   CAPITAL TREATMENT OF INSURANCE

Introduction

Critical to the viability of recognizing insurance as a risk mitigant in the New Accord, is a methodology for calculating the capital relief resulting from insurance in manner which is fair, consistent and accurate way.   In an effort to assist the Committee in considering this aspect, in this section we discuss issues related to the capital treatment of insurance and outline several approaches to calculating the capital relief and incorporating them in the operational risk capital calculation.

Pillar 1 minimum capital requirements should, as much as practical, correspond to the overall level of risk of each individual institution.   To recognize the benefits from improved measurement and management of risk, the Committee has set out a series of measurement techniques that follow increasing levels of sophistication and risk sensitivity.   Our suggested methods are designed to mirror the Committee's approach and objectives, by offering a continuum of approaches to capital relief that will match the complexity, risk-sensitivity and flexibility of the continuum of approaches outlined by the Committee.

Specifically, we will present the following options for calculation of the capital relief for insurance:

Capital Approach	Capital Relief Approach
Basic	(a) Premium Approach The sum of insurance policy premiums is used as a single indicator proxy for measuring capital relief. Capital relief is determined by multiplying premiums by a prescribed fixed percentage and a ratio to reduce the expected loss portion of the risk transferred. (b) Limits Approach Capital relief is equal to the sum of the limits from qualifying insurance policies less insurance premiums, multiplied by a factor for the breadth of coverage of each insurance policy.
Standardised	(a) Premium Approach (b) Limits Approach Both approaches are identical to those described above for the Basic Approach, except the calculation for capital relief is performed after summing capital for all business lines.
IMA	(a) Premium Approach Premium is used as an indicator for risk transfer and is multiplied by the expected reduction in loss severity (from bank specific data) multiplied by a prescribed second gamma factor (based on industry-wide data). (b) Limits Approach The capital relief associated with a policy is the portion of the limit that covers the unexpected losses adjusted by a reduction for the expected loss through insurance. If the policy does not match 1:1 with a risk segment, then an additional coverage breadth factor is introduced to adjust for the residual risk.
LDA	Based on a bank's historical data, gross loss frequency and severity distributions are established. The reduction of the high percentiles of the combined loss distribution through insurance is directly simulated, leading to the net capital. Complex or alternative insurance structures can naturally be incorporated.

General Comments

Before outlining each of the approaches, we would like to address certain issues related to the capital treatment of insurance.

1. *Capital Relief for All Approaches*

    We strongly recommend that insurance be explicitly included for each of the approaches to appropriately reflect the risk profile of each institution and to encourage prudent and sound risk management.

    In the September 2001 Working Paper, it was suggested that insurance be recognized as a risk mitigant in the New Accord. However, it was further explained that explicit measured relief would be limited to banks that qualify for the AMA approaches and that the re-calibrated lower factors for Basic and Standardised Approaches were intended to encompass the effects of insurance on an industry-wide basis. Therefore, banks using Basic and Standardised would not have an opportunity to incorporate the benefits of their individual insurance program and would lack an incentive to use insurance as part of a prudent risk management practice. We regard this split form of recognition as contradictory to the risk sensitive and risk positive framework that supervisors seek to establish. The application of insurance ought to be a separate and explicit stage in the assessment of the minimum requirement of capital under all Approaches.

    Several principal points arise:

    a) The desire to create a "level playing field". Certain banks based on their size and type of operations, may not be in a position to move to the advanced Approaches. The Basic and Standardised Approaches are admittedly limited in risk sensitivity. Explicitly including insurance will allow these banks at least one way in which they can control their risk and get recognition for such efforts like their counterparts in the AMA Approaches.

    b) Furthermore there would appear to be an inconsistent treatment of insurance across different business lines both in respect of the explicit and implicit mitigation but also the potentially differing criteria for insurance delivering capital relief.

    c) Of central concern is that insurance's role as mitigant of the capital charge has been incorporated, yet no clear rubric is given for the nature or manner of its reduction of capital. The most obvious result of the current proposal will be that banks buying little or no insurance are advantaged to those that purchase a more prudent and robust insurance program.

2. *Continuum of Approaches*

    We suggest that the approach to capital relief should mirror the complexity, flexibility, and risk sensitivity of each of the proposed continuum of Approaches. Therefore, the capital relief calculation for insurance under the Basic and Standardised should match the risk sensitivity and simplicity of those Approaches and encourage movement to the more advanced Approaches.

3. *Limit to Capital Relief*

We recognize the need to incorporate a limit to the amount of capital relief resulting from insurance. We acknowledge that a specific floor should be incorporated within each of the approaches to calculating the capital relief. With the application of the floor in the capital relief calculation, the 75% floor applicable to AMA approaches should not include insurance, but rather reflect the gross calculations before insurance.

4. *Adjustment to Overall Calibration*

In the September 2001 Working Paper, the Committee stated its intentions to lower the assessment of operational risk regulatory capital to 12% relative to the current minimum regulatory capital. However, this reduction assumed that the Basic and Standardised Approaches would not include an explicit reduction for insurance. As we are proposing that both the Basic and Standardised Approaches recognize insurance, the Committee may want to consider the impact of such recognition on the calibration and may need to increase the basic factors. An increase to "alpha" and "beta" will then allow banks to reduce their overall capital to the desired level through the use of insurance risk transfer.

5. *Expected Loss vs. Unexpected Loss*

One of the challenges for operational risk is the distinction of expected loss and unexpected loss. This challenge is also applicable to insurance. We recognize that only insurance that is transferring unexpected loss should receive capital relief. We attempt to incorporate this distinction into each of our suggested approaches.

6. *Qualifying Contracts*

There are a wide variety of products and approaches to using insurance as a risk mitigant for operational risks. We believe the New Accord should recognize any form of insurance that is effectively reducing the economic impact of operational risk losses. However, there needs to be a balance between flexibility and ease of use. We therefore propose that under the Basic and Standardised Approaches, perhaps a prescribed list of standard insurance products could be implemented by banking supervisors, while the AMA Approaches would remain flexible to recognize a wider range of insurance techniques.

The Approaches for Capital Relief

The focus of this section is on the calculation of the risk reduction achieved through a bank's insurance program. The various approaches to capital calculation currently described by the Committee relate to the gross unexpected loss before inclusion of insurance. We therefore are attempting to adjust this gross calculation to recognize the risk mitigation benefits of insurance.

We have chosen to use the notation K_g to indicate reference to capital required before insurance and have adopted the notation K_n to indicate the net adjusted capital after inclusion of insurance. The difference between capital before and after inclusion of insurance would equal the capital relief from insurance. This yields the following basic formula:

$$K_n = K_g - K_{RT}$$

Where,

K_g = Gross Capital (before insurance)

K_{RT} = Risk Transfer (capital relief from insurance)

K_n = Net Capital after inclusion of insurance

The following outlines possible methodologies for determining K_n and K_{RT} under each of the approaches.

Approach to Capital Relief in Basic and Standardised

We present two alternative proposals for calculating capital relief from insurance for the Basic and Standardised Approaches. Recognising that the Committee has concerns about including insurance within the Basic and Standardised, these Approaches are intentionally designed to be a conservative approximation to allow for greater recognition, risk sensitivity, and flexibility in the more advanced approaches.

Basic Approach

Banks that will be using the Basic Approach will likely be those institutions that are not internationally active, and lack the data or modelling sophistication to use the more advanced approaches offered by the Committee. These institutions will generally be those that are most active in traditional fee-based and interest income (lending and other credit-based) businesses. The insurance industry has standard products that cover a significant portion of the risk classes faced by traditional banking institutions (see Taxonomy and Mapping sections above). While all banks purchase insurance products, there are significant differences in the amount of insurance and types of coverages purchased. It is appropriate therefore for the methodology to recognise these differences and afford higher capital offset to banks that have comprehensive and extensive amounts of insurance risk transfer programs compared to those that have minimal programs.

Both approaches calculate capital requirements at a company-wide level, and provide partial relief from capital requirements for all qualifying standard insurance policies. The first alternative (referred to as the "Premium Approach") bases the calculation for capital relief for insurance contracts on the premiums paid for such policies. The second (referred to as the "Limits Approach") bases the calculation of capital relief for insurance contracts on the difference between expected loss levels and the individual insurance policy limits purchased by the bank.

Premium Approach for Basic

In the Premium approach, capital relief for insurance products is calculated based on aggregate premiums paid by the bank for qualifying standard insurance contracts. The foundation for the use of premiums is that insurance premiums are directly correlated with the amount of risk that is transferred between the insurer and the insured. Inherent within an insurance premium to some extent is the

breadth or scope of coverage, the attachment point (the insured's deductible or retention), the limit of coverage, the loss history, volatility of loss, and quality of risk management. Because an insurer is able to diversify the risks underwritten for many banks, the amount of insurance premium charged can be more efficient than the amount of capital that an individual bank would need to hold against such events.

Using the Premium approach, calculation of the amount of reduction for risk transfer products (K_{RT}) is as follows:

Premium Approach for Basic

$K_{RT} = P^* \times \lambda$

Where λ = Fixed percentage set by the Committee, relating the industry-wide level of risk transfer to industry-wide level of insurance premium.

Where P^* is an adjustment to insurance premium as follows:

$P^* = P \times [1-P/\text{Limit}] \times CR_p$

P = the nominal insurance premium of each qualifying policy

CR_p = Credit Risk Discount Factor which adjusts for counterparty credit risk based on insurer's credit rating (as detailed in the Credit Risk Discount section)

The key to the Premium Approach, is the calibration of λ. This will need to be approached with further discussion, research, data, and analysis.

Strengths:
- Simple formula
- Provides link between Pillar I and Pillar III
- Insurance premium is measure of risk driven by market forces
- Avoids high-limit/low probability coverage arbitrage potential of Limits Approach

Weaknesses:
- Does not explicitly take into account differences in amounts of insurance limits
- Does not take into account the efficiency of premiums paid (premiums paid toward tail risks are more efficient in mitigating the risk that regulators are seeking – 99.9%)
- Determining value of lambda.
- Premiums fluctuate with market cycles.

Limits Approach for Basic

In the Limits Approach, capital relief is based on the difference between expected losses and the insurance policy limits and respective premiums. This approach seeks to provide banks with capital relief for only the unexpected loss portion of the operational risk curve – the section of the curve for which capital is intended. Limits are an appropriate measure as they represent the maximum amount of risk transferred to the insurer.

In the Limits Approach, the insurance premium paid is assumed to represent the portion of the risk applicable to the expected loss. Therefore, the policy limit less the insurance premium should be the amount of the policy limit related to the unexpected loss that is transferred through the insurance policy. To obtain risk adjusted limit and to avoid regulatory arbitrage, we introduce the notion of coverage breadth that seeks to reduce the amount of relief to a level that corresponds to the risk contribution defined by the insurance policy.

Using the Limits approach, calculation of the amount of reduction for risk transfer products (K_{RT}) is as follows:

<div style="border:1px solid black; padding:10px;">

Limits Approach

$$K_{RT} = \sum_{p \in policy} (L_p - P_p) \times CB_p \times CR_p$$

L_p Limit of insurance policy p

P_p Insurance premium of policy p

CB_P Coverage breadth of policy p

CR_P Credit risk haircut of policy p

</div>

The coverage breadth factor (CB_P) is intended to adjust the policy limit in accordance with the breadth of coverage provided by the specific policy. Policies that cover the entire spectrum of operational risk as defined by the New Accord, would have a CB_P close to 1.0. The narrower the scope of coverage, the lower the factor. The determination of this factor will need to be determined based on the mapping of insurance policies (see Annex 3) and empirical data.

Strengths:

- Provides for more capital relief with higher limits, which are more likely to reduce banks' economic capital requirements.
- Recognizes that economic capital relief for banks is more likely to come from higher limit coverage.
- Applicable to standard peril-specific policies as well as comprehensive policies.

Weaknesses:

- Need way to differentiate between aggregate and each loss limits.
- Need to distinguish portion of limit in EL.

- Could lead to arbitrage opportunities for high-limit, extremely low probability coverage if limits were purchased higher than the UL.

Standardised Approach

The two methodologies offered for calculating risk transfer capital relief (K_{RT}) under the Standardised Approach are identical to those suggested above for the Basic Approach. The calculation of K_{RT} occurs after performing the summation of Capital (K) for each of the business lines. It is not necessary to allocate insurance at the business line level.

Advanced Measurement Approaches (AMA)

The Committee allows for more flexibility for banks to use more advanced modeling approaches for operational risk capital requirements. As there are several techniques mentioned by the Committee, we will first address the inclusion of insurance in the Internal Measurement Approach (IMA), and then focus our attention to the Loss Distribution Approach (LDA).

Internal Measurement Approach
Similar to the Basic and Standardised approaches, we offer two alternative methods for determining the capital relief from insurance for the Internal Measurement Approach (IMA). Again, one is based on premiums, the other on limits. As IMA is considerably more risk sensitive than the simpler approaches, we can additionally show how to apply different insurance structures (aggregate loss and each and every loss) as each modifies the risk situation of a bank differently and can be reflected in the capital calculation. Finally, since implementing these approaches requires allocation of insurance lines to risk segments, we will treat the issue of quantitatively mapping a given insurance product to the 56 business unit/risk type combinations (risk segments). This becomes relevant when insurance coverages do not align perfectly with the risk classes.

We will first summarize each of the methods, then follow with a detailed derivation of each for the technically inclined reader.

Premium Approach for IMA - Summary

The premium approach for capital relief through insurance attempts to mirror the general approach used by the Committee for calculating gross capital under IMA. The IMA approach for gross capital is calculated for each business line and loss type, using a bank's Exposure Indicator as a scaling factor, multiplied by the Expected Loss determined by the bank's data, multiplied by a gamma, an industry-wide prescribed factor describing the relationship between EL and UL based on industry data. The Premium Approach for capital relief would be calculated in the same way. Insurance Premium will be used as the exposure indicator for risk transferred, multiplied by the expected loss reduction determined by the bank's data, multiplied by a second gamma, an industry-wide prescribed factor describing the relationship between EL reduction through insurance based on industry data.

IMA Capital Calculation before insurance: $K_g = EI \times PE \times LGE \times \gamma$ or $K_g = EL \times \gamma$

IMA Capital Relief Calculation: $\quad\quad\quad\quad\quad\quad\quad K_{RT} = ELR \times \gamma^{RT}$

Net Capital Calculation with Insurance: $\quad\quad K_n = K_g - K_{RT}$

Where EL and ELR_k are based on bank specific data, and represent gross expected loss and expected loss reduction through insurance respectively.

Where γ and γ_k^{RT} are regulatory prescribed based on industry-wide data.

(Haircuts for credit risk are implicitly incorporated in ELR_k as described later).

The capital relief $K_{RT,k}$ per risk class k is given by

$$K_{RT,k} = \gamma_k^{RT} \times ELR_k \, ,$$

The total capital relief should be calculated as the simple sum over all risk segments, corresponding to the methodology of calculating the risk capital itself.

Strengths:
- Aggregate and each and every loss covers can be treated with one formula.
- Coverage breadth of policy is automatically taken into account in an implicit way via the price of the insurance
- Methodology consistent with the gross capital calculation under IMA

Weaknesses:
- A second gamma factor γ_k^{RT} needs to be determined from industry-wide data.

Limits Approach for IMA - Summary

In the Limits Approach, capital relief is based on insurance policy limits. If the policy matches 1:1 with the risk segment (k), the capital relief associated with that policy is the portion of the limit that covers the unexpected losses of that risk segment (adjusted by a reduction for the expected loss through insurance and the credit risk of insurer). If the policy does not match 1:1 with the risk segment (k), then an additional coverage breadth factor (CB) is introduced to adjust for the residual risk.

Insurance policy limits can either be applied on an aggregate or per loss basis, therefore, it is necessary to design a formula for each to appropriately determine that portion of coverage provided by the policy that is related to the unexpected loss of the risk segment.

The capital relief $K_{RT,k}$ per risk class k is given by

Aggregate loss insurance:

$$K_{RT,k} = (L_{agg,k} - P_k) \times CR_k \quad\quad\quad\quad \text{if} \quad\quad D_{agg,k} + L_{agg,k} \leq UL_{gross,k} \text{ and } EL_{gross,k} < D_{agg,k}$$

Each and every loss insurance:

$$K_{RT,k} = \left(\min\left[\sqrt{\overline{N}_k}\; l_{ee,k} ; L_{agg,k} \right] - \frac{1}{\sqrt{\overline{N}_k}} P_k \right) \times CR_k \quad \text{if} \quad d_{ee,k} + l_{ee,k} \le UL_{X,k_{gross}} \quad \text{and} \quad EL_{X,k_{gross}} \le d_{ee,k}$$

With L_{agg} and D_{agg} being the annual aggregate limit and deductible of the policy, l_{ee} and d_{ee} being the each and every loss limit and deductible, P being the annual premium, $\overline{N}$ being the average (expected) number of relevant losses, CR being the credit haircut factor, and El_X and UL_X being the expected and unexpected individual losses in risk segment k.

The total capital relief should be calculated as the simple sum over all risk segments, corresponding to the methodology of calculating the risk capital itself.

Strengths:
- No additional gamma factor needs to be calibrated.
- Approach directly reflects effect of insurance on the risk-determining high percentiles of the loss distribution.

Weaknesses:
- If applied to insurance products that do not match 1:1 a given risk segment a breadth of coverage factor needs to be applied. This factor needs to be derived / set by the Committee analogously to the gamma factors.

Premium Approach for IMA – Detailed Derivation

A) Mapping Insurance Products to Risk Segments

We assume that we have m different business lines and n different risk categories (event types) resulting in an overall number of $mn =: K$ different risk segments. Moreover we assume that there are L different insurance products with each covering a certain subset of risk segments whereby some risk segments might be covered by several products. In order to generate a mapping between risk segments and insurance products we define an insurance product-risk segment - matrix $P := (p_{lk})_{l=1,\cdots,L;k=1,\cdots,K}$ where for each insurance product l the entry $p_{lk} \in [0,1]$ denotes the percentage of claims arising from risk segment k. Note that claims are transferable losses that are covered by an insurance product whereas uncovered losses are to be born by the bank itself. Consequently, we have

$$\sum_{k=1}^{K} p_{lk} = 1 \quad \text{for all } l = 1, \cdots, L.$$

We can also understand p_{lk} as the average share of claims covered by insurance product l that arise from risk segment k.

To calculate the p_{lk} we use the loss history of $t = 1, \cdots, T$ years. Let $C_{k,l,t}$ denote the amount of claims in risk segment k that is covered by insurance product l in year t. Moreover let $C_{l,t}$ and $P_{l,t}$ denote the amount of claims resulting from and the premium spent on insurance product l in year t.

Then we can estimate p_{lk} by

$$p_{lk} = \frac{\sum\limits_{t=1}^{T} C_{k,l,t}}{\sum\limits_{t=1}^{T} C_{l,t}}$$

B) Calculating the capital relief

The risk transfer capital relief is determined by transforming the expected loss reduction by insurance via a second γ – factor. Thereby we assume that the expected loss reduction by insurance linearly depends on an insurance premium indicator, which we derive in an appropriate manner from industry-wide loss data. The calculation of a bank's internal loss reduction per invested premium unit is then done using historical claims and premium data as shown below.

For $l = 1, \cdots; L$ let P_l denote the amount of premium spent on insurance product l. Then we define by

$$PI_k = \sum\limits_{l=1}^{L} P_l \times p_{lk} \times CR_l$$

an insurance indicator for risk segment k that is weighted with the credit risk haircut factors CR_l of the contributing insurance policies. In an analogous way to the calculation of the expected loss in the IMA, we calculate the expected loss reduction by insurance ELR_k by

$$ELR_k = LR_k \times PI_k$$

where LR_k denotes the bank internal loss reduction per invested premium unit for risk segment k, which can be estimated by

$$LR_k = \frac{\sum\limits_{t=1}^{T}\sum\limits_{l=1}^{L} C_{k,l,t}}{\sum\limits_{t=1}^{T} \sum\limits_{l=1}^{L} P_{l,t} \times p_{lk}} = \frac{\sum\limits_{t=1}^{T}\sum\limits_{l=1}^{L} p_{lk} \times C_{l,t}}{\sum\limits_{t=1}^{T}\sum\limits_{l=1}^{L} P_{l,t} \times p_{lk}}.$$

Analogously to the calculation of the capital charge $K_g = UL_k$ for risk segment k via

$$K_{g,k} = \gamma_k \times EL_k, \quad (\gamma_k \text{ delivered by the Committee}),$$

the risk transfer capital relief by insurance $K_{RT,k}$ after inclusion of insurance is calculated via

$$\boxed{K_{RT,k} = \gamma_k^{RT} \times ELR_k}$$

where γ_k^{RT} is to be determined by the Basle Committee for transforming the expected loss transfer by insurance into the capital relief from insurance. Since most insurance contracts are non-proportional ones, there should be a leverage effect in the capital relief from insurance, which implies $\gamma_k^{RT} > \gamma_k$. On the other hand, imposing an aggregate limit L_{agg} on the claims to be covered by insurance for a specific risk segment and assuming that the attachment point D_{agg} is appropriately chosen, the capital relief by insurance is limited from above by $L_{agg} - PI_k$ which implies

$$\gamma_k^{RT} \leq \frac{L_{agg} - PI_k}{ELR_k} := \gamma_{\max}.$$

Consequently, we recommend choosing $\gamma_k^{RT} \in [\gamma_k, \gamma_{\max}]$.

Finally, we obtain a net risk capital $K_{n,k}$ for risk segment k by means of

$$K_{n,k} = K_{g,k} - K_{RT,k} = \gamma_k \times EL_k - \gamma_k^{RT} \times ELR_k.$$

Limits Approach for IMA – Detailed Derivation

The limit-based approach develops its fullest strength when applied to insurance products, already existing or newly to be developed, that constitute a 1:1 match between provided coverage and a risk segment. In this case, it directly reflects the effect of insurance on the risk-determining high percentiles of the loss distribution. In the case of an imperfect correspondence between coverage and risk segment, a 'coverage breadth' factor *CB* needs to be introduced. We describe the principle of the limit based approach upfront on the example of 1:1 matching and discuss methods to deal with practical issues such as incomplete correspondence in the end of this chapter.

A) Aggregate Insurance

For a given risk segment *k* (index omitted in the following), assume an aggregate coverage attaching at D_{agg} with a coverage limit of L_{agg}. Aggregate in this context refers to the sum of all claims arising

from a given risk segment k within one year. (It does not denote an aggregation over several risk segments.

Let UL_{net} denote the unexpected (annual) loss after the insurance. Assuming P to be the insurance premium, we obtain before credit haircut:

$$K_{net} (= UL_{net}) = UL_{gross} - L_{agg} + P \qquad \text{if} \qquad D_{agg} + L_{agg} \le UL_{gross} \quad \text{and} \quad EL_{gross} < D_{agg}$$

and consequently

$$K_{RT} = L_{agg} - P \qquad \text{if} \qquad D_{agg} + L_{agg} \le UL_{gross} \quad \text{and} \quad EL_{gross} < D_{agg}$$

To show this, note that $UL_{net} = F_{S,net}^{-1}(0.99) - EL_{net}$. (We are assuming in this example the UL to be defined as the 99th percentile of the annual loss distribution). The argument, however, does neither rely on this specific percentile nor on any explicit characteristics of the annual loss distribution.

From the assumption that the coverage applies within the unexpected loss, i.e., $D_{agg} + L_{agg} \le UL_{gross}$, we obtain $F_{S,net}^{-1}(0.99) = F_S^{-1}(0.99) - L_{agg}$. By assuming the retained expected loss by the bank EL_{net} to be given by $EL_{net} = EL_{gross} - P$, we get $K_{net} = UL_{gross} - L_{agg} + P$.

Introducing finally the haircut for credit risk under the policy that covers the risk segment k, CR_k, we finally obtain for capital relief in a given risk segment k:

$$\boxed{K_{RT,k} = (L_{agg,k} - P_k) \times CR_k \qquad \text{if} \qquad D_{agg,k} + L_{agg,k} \le UL_{gross,k} \quad \text{and} \quad EL_{gross,k} < D_{agg,k}}$$

The condition that the coverage applies within the unexpected loss can be easily tested through evaluation of EL_{gross} and UL_{gross}, which are available through the bank's data collection, and direct comparison with D_{agg} and L_{agg}. The condition can be included into the formula for the calculation of the capital relief by introducing an 'effective limit' L_{eff} via min/max conditions, giving

$$L_{eff,k} = \min[L_{agg,k} - \max(EL_{gross,k} - D_{agg,k}; 0); UL_{gross,k} - \max(D_{agg,k}; EL_{gross,k})]$$

$$K_{RT,k} = (\min[L_{agg,k} - \max(EL_{gross,k} - D_{agg,k}; 0); UL_{gross,k} - \max(D_{agg,k}; EL_{gross,k})] - P_k) \times CR_k$$

B) Each and Every Loss

All losses are subject to one each and every deductible d_{ee} and one each and every limit l_{ee}. Differently to the above, we need to address the claim frequency explicitly for this common policy structure. As above, we treat here the case of a perfect 1:1 match between coverage and risk segment and refer to the next section for issues of incomplete correspondence.

We assume the unexpected loss to be given by $UL_S = g(N)UL_X$, where $g(\cdot)$ is a function that, for a given frequency, transforms the unexpected loss of the severity to the one of the aggregate loss. We

will discuss an appropriate approximation of $g(.)$ at the end of this paragraph. By the same definition as in the aggregate limit loss case, we obtain $UL_{S_{nett}} = g(N)\,UL_{X_{net}}$, where S_{net} and X_{net} are the random variables of aggregate loss and severity, respectively, after the application of insurance coverage.

By assuming $d_{ee} + l_{ee} \le UL_{X_{gross}}$ we can insert $F_{X_{net}}^{-1}(0.99) = F_{X_{gross}}^{-1}(0.99) - l_{ee}$ in the previous equation, obtaining:

$$UL_{S_{net}} = g(N)\left(F_{X_{gross}}^{-1}(0.99) - l_{ee} - EL_{X_{net}}\right).$$

Moreover, by assuming that the retained expected loss of a bank can be expressed as:

$$EL_{X_{net}} = EL_{X_{gross}} - \frac{P}{N},$$

we get for the unexpected loss after insurance:

$$UL_{S_{net}} = g(N)\left(F_{X_{gross}}^{-1}(0.99) - l_{ee} - EL_{X_{gross}} + \frac{P}{N}\right).$$

This equation can be simplified to obtain:

$$UL_{S_{net}} = UL_{S_{gross}} - g(N)l_{ee} + \frac{g(N)}{N}P,$$

with again

$$UL_{S_{nett}} = K_{net}.$$

As in the discussion of aggregate limit, the argument does not depend of the explicit form of the severity distribution of the choice of the percentile as defining the *UL*.

Finally, what is an adequate approximation for $g(N)$?

We assume the aggregate loss distribution S to be a compound distribution of a frequency distribution R and a severity distribution Q (independent random variables N and X, respectively)

$$S = \sum_{N=0}^{\infty} R\{N\}Q^{*N}$$

We then have

$$VAR[S] = E[N] * Var[X] + E[X]^2 * Var[N]$$

For frequency distributions with 'not too bad' under or over dispersion this is approximately linear in N. (For R=Poi(lamda) it is exactly true as the formula reduces to $VAR[S] = $ lamda $* E[X^2] = E[N] * E[X^2]$)

Consequently the standard deviation of S scales with the expected loss count E[N] as

$$\sigma_S \to \sqrt{E(N)}\,\sigma_S$$

If the unexpected loss is defined to be a multiple of the standard deviation then consequently UL scales with the expected loss count in a similar form. (UL_1 is the unexpected loss for unit-(frequency) exposure, EI_f is the exposure indicator for frequency exposure and EI_s is the exposure indicator for severity exposure.)

$$UL = \sqrt{E(N)}\,UL_1 = \sqrt{E(N)} \times LGE \times EI_s$$

If the unexpected loss is defined as a high percentile of the compound distribution minus expected loss, $F_S^{-1}(0.99) - EL_S$, then a qualitatively similar behaviour (approximately square-root behaviour) can be found.

This suggests defining g(N) as

$$g(N) = \sqrt{E(N)}$$

The expected loss number is estimated by an annual average from the loss data in risk segment k of the bank via

$$\hat{E}(N_k) = \overline{N}_k = \frac{1}{T}\sum_{t=1}^{T} N_{k,t}$$

In order to avoid that non-relevant loss processes disturb the picture, it is worth considering to introduce a threshold for losses to be taken into account, e.g., only losses above EL or only losses exceeding the attachment point. Finally, we take a possible annual limit of the insurance policy into account and introduce the credit risk factor CR_k to obtain:

$$K_{RT,k} = \left(\min\left[\sqrt{\overline{N}_k}\, l_{ee,k}; L_{agg,k} \right] - \frac{1}{\sqrt{\overline{N}_k}} P_k \right) \times CR_k \quad \text{if} \quad d_{ee,k} + l_{ee,k} \le UL_{X,k_{gross}} \quad \text{and} \quad EL_{X,k_{gross}} \le d_{ee,k}$$

C) Mapping coverages to risk segments

The limits based approach develops its fullest strength when applied to existing or newly developed insurance products that constitute a 1:1 match between provided coverage and a risk segment. In this case it directly reflects the effect of insurance on the risk-determining high percentiles of the loss distribution. An imperfect matching introduces a certain amount of additional complexity, which can be dealt with as outlined in this paragraph. We cover the three aspects that are most important for a practical application.

1. Imperfect match between policy and risk segment because of limited coverage or exclusions:

To deal with this issue we consider the risk segment to be divided into two sub segments, one being fully covered and the other being without coverage. Following the concept of obtaining the overall capital by addition of the individual capital contributions, we introduce a 'coverage breadth' factor CB_k that relates the amount of risk that is covered under the policy to the total amount of risk in the segment.

$$K_{RT,k}* = K_{RT,k} \times CB_k$$

This modified $K_{RT,k}*$ replaces the original $K_{RT,k}$ in the final formulas.

2. An insurance covers multiple risk segments with simultaneous annual limit:

In this case a major loss in one segment could erode the coverage of other segments, and the full protection is not independently available to all segments. A detailed treatment of this case is possible in the LDA approach by incorporating a certain correlation between loss events. Under IMA we suggest to grant full relief for all covered segments if an automatic reinstatement of coverage is contractually agreed.

3. Multiple policies covering one risk segment or different elements within one segment

This case is treated similarly to the comments made under 1.A) by introducing insurance product-risk segment factors $p_{l,k}$, leading to

$$K_{RT,k} = \sum_{l=1}^{L} (Limit - Premium) \times p_{l,k} \times CR_l \times CB_l .$$

The $p_{l,k}$ are defined as described in 1.A), and *(Limit-Premium)* stands short for the respective cases under 2.A) and 2,B).

Loss Distribution Approach

The implementation of oss Distribution Approaches (LDA) has the benefit of allowing a fairly accurate replication of the risk profile of a bank, including the risk reducing affect of insurance. Nevertheless, it requires banks to develop sophisticated models and compile substantial data sets. By incorporating a bank's insurance details with its gross loss distribution, a modified net loss distribution can be formed based on the reduction of loss severity resulting from risk transferred through insurance.

Transferring risk to an insurer through insurance products alters the aggregate loss distribution by reducing the severity of losses that exceed the policy deductible amount. The frequency of loss is unaffected by insurance. The basis of the net LDA model is that when frequency and severity curves are combined through simulation, each individual loss point can be compared to the specific insurance policies purchased by the bank and the corresponding policy limits and deductibles.

To discuss the incorporation of insurance into the LDA, first we will demonstrate the effects of insurance on a loss distribution, then we will detail the methodology for including insurance in the capital calculation.

Effect of Insurance

First we will demonstrate the effects of insurance on a loss distribution by presenting a hypothetical risk for a given line of business, and comparing the effects on the loss distribution and required capital (the Unexpected Loss portion) for three scenarios a) with no insurance, b) with aggregate loss insurance[12], and c) with each and every loss insurance[13]. [14]

<u>Hypothetical Risk</u>

Frequency: assume average of 10 events per year

Distribution of the Number of Events (*PE* with IMA)

---
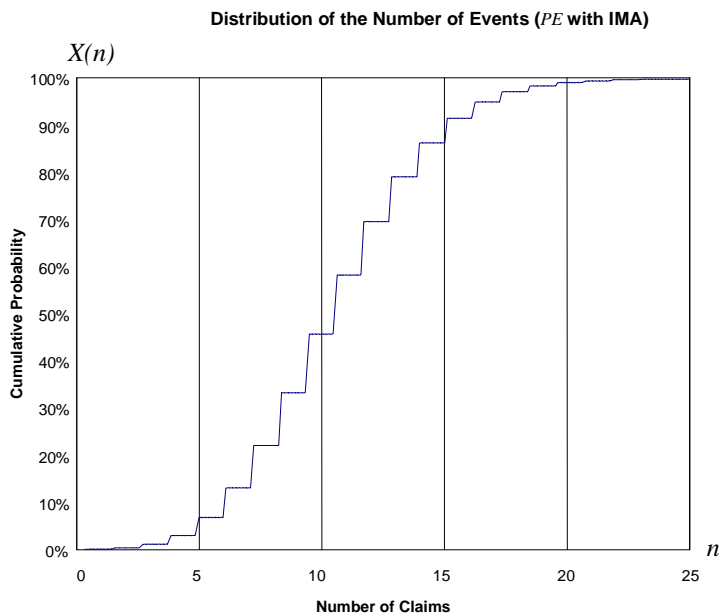
[12] "Aggregate loss insurance" is intended to refer to insurance policies that have limits and deductibles that are applied on an aggregate annual basis.

[13] "Each and every loss insurance" is intended to refer to insurance policies that have limits and deductibles that are applied to each and every loss.

[14] We acknowledge the work and ideas contributed by Aon Corporation for this discussion on demonstrating the effects of insurance.

Severity: assume average 10 million loss per event (100 million in aggregate)

Severity Distribution of the Events (*LGE* with IMA)
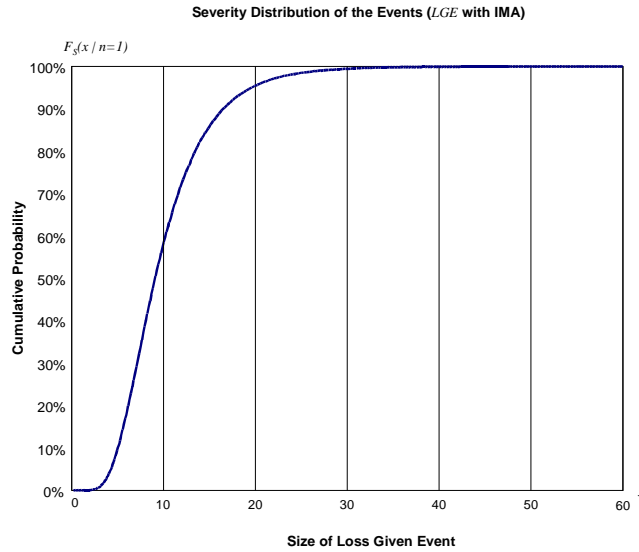
Example A – No Insurance

Compounding the frequency and severity distributions, the following chart demonstrates how the capital charge would be determined assuming the charge is based on a pre-defined probabilistic level, in this case 99%.

Aggregate Distribution (No Risk Transfer)
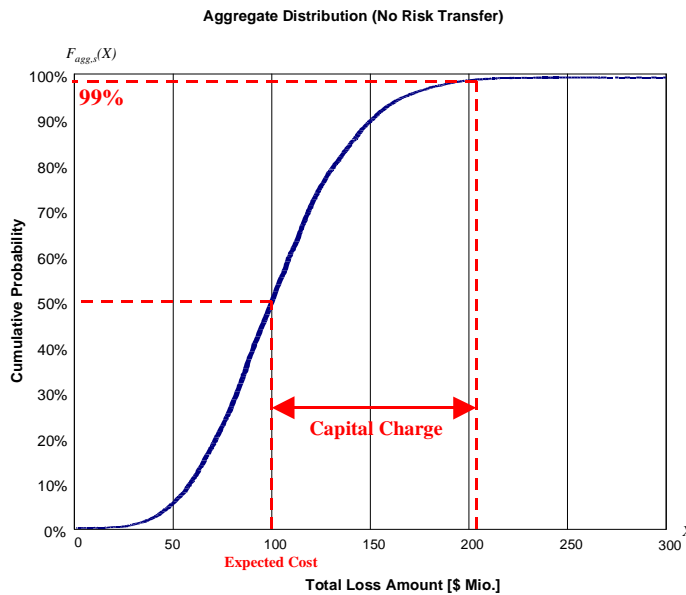
Example B – With Insurance (Aggregate Deductible and Aggregate Limit)

We now consider that the bank has an insurance policy covering the risk of this specific risk segment and this policy has an aggregate limit and deductible.

Policy Limit: Assume 50 million in aggregate

Bank's Retention: Assume 100 million in aggregate

Aggregate Distribution (Agg. Insurance)
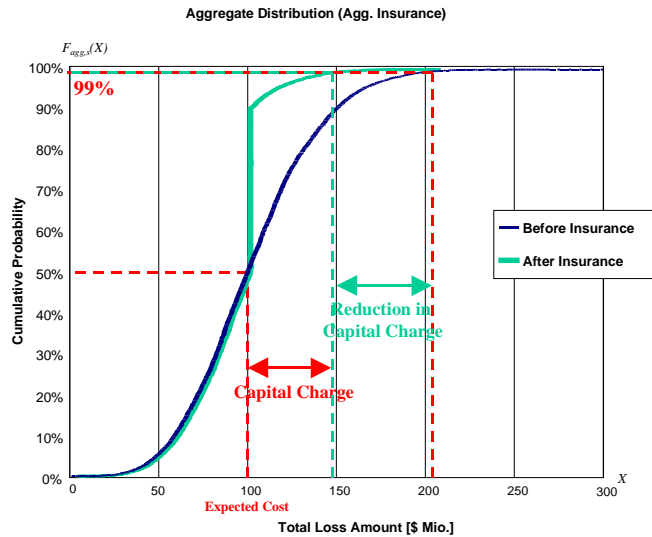
Example C – With Insurance (Per Loss Deductible and Per Loss Limit)

Finally, we look at the effect on the same risk when the bank has an insurance policy that is based on a deductible and limit for each and every loss.

Policy Limit: Assume 10 million each loss

Severity Distribution of the Events (LGE with IMA)
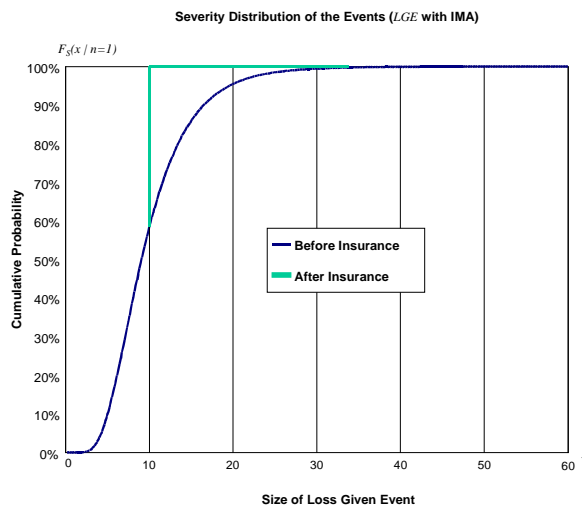
LDA Methodology

To incorporate insurance coverage into LDA models, first, risk transfer policies must be mapped to risk classes and business lines, as demonstrated in the Taxonomy section above. Second, for each individual policy, the following factors need to be incorporated into the model for each policy:

1. Mapping of the policy to risk category and business line.
2. Amount of policy limits and indication of type of limit (aggregate or each loss).
3. Amount of deductible or retention and indication of type of deductible (aggregate or each loss).

In brief, the LDA methodology can be described as determining the required capital by use of a loss distribution model to calculate the difference between the value at a pre-specified point on the aggregate loss distribution (99% in this example) and the expected loss (EL or mean of the distribution). Therefore, the capital calculation under LDA before and after insurance recoveries is as follows:

Gross capital requirement before insurance: $K_g = F_{agg}^{-1}(0.99) - EL$

Net capital requirement after insurance: $K_n = F_{agg}^{net^{-1}}(0.99) - EL$

Where $F_{agg}(x)$ is the aggregate loss distribution corresponding to operational risk based on gross losses, absent of insurance, and $F_{agg}^{net}(x)$ is the loss distribution of risk remaining with the bank after applying insurance recoveries.

The purpose of this section is to demonstrate how to determine the net loss distribution after insurance, $F_{agg}^{net}(x)$ by combining the specifics of the insurance programs with the aggregate loss distribution.

To determine the net loss distribution, $F_{agg}^{net}(x)$, we start by looking at the random variables of the aggregate loss distribution.

Let S_{agg} denote the random variable for aggregate losses with distribution $F_{agg}(x)$. S_{agg} can be expressed as:

$$S_{agg} = \sum_{i \in BL, j \in RC} \sum_{n=1}^{N_{ij}} X_{ij,n},$$

where the subindices *BL* and *RC* indicates business line and risk category, respectively and *N* denoting the number of losses.

Next, we determine the effect of the insurance on each loss by subtracting out the insurance recovery (based on the corresponding policy limit and deductible) from the gross loss amount

31

for each loss event (random variable X). We also adjust the net result of each with the credit risk haircut (CR_p).

Where we can apply risk transfer to S_{agg} in order to obtain the corresponding random variable after risk transfer S_{agg}^{post} :

$$S_{agg}^{post} = S_{agg} - \sum_{i \in BL, j \in RC} \min\left(L_{agg}, \max\left(\sum_{n=1}^{N_{ij}^{TR}} \min\left(l_{ee}, \max\left(X_{ij}^{TR} - d_{ee}, 0 \right) \right) - D_{agg}, 0 \right) \right) \times CR_p$$

d_{ee}, D_{agg} denote each and every, respectively, aggregate deductibles of an insurance policy.

l_{ee}, L_{agg} denote the each and every, respectively, aggregate limits of an insurance policy.

The net capital requirement is now obtained by means of subtracting the net expected loss from the net aggregate loss distribution:

$$K_n = F_{agg}^{net^{-1}}(0.99) - EL$$

Annex 1: List of Supporting Companies

The company that provided this paper as a handout at the Capital Allocation for Operational Risk Conference did not include Annex 1.

Event-Type Category (Initial Level)	Event-Type Category (Level 1)	Definition	Categories (Level 2)	Activity Examples (Level 3)	Business Risk?
People/Relationship Risk The risk of loss intentionally or unintentionally caused by an employee or involving employees, or losses caused through the relationship or contact that a firm has with its clients, shareholders, third parties, or regulators.	Internal acts	Losses due to acts of a type intended to defraud, misappropriate property or circumvent regulations, the law or company policy, excluding diversity/discrimination events, which involves at least one internal party.	Unauthorized Activity/Trading Misdeeds	Transactions not reported (intentional)	N
				Trans type unauthorized (w/monetary loss)	N
				Mismarking of position(intentional)	N
				Insider trading	N
				Frontrunning	N
				Market manipulation	N
				Trading above limits	N
			Theft and Fraud	Fraud/credit fraud/worthless deposits	N
				Theft extortion/embezzlement/robbery	N
				Misappropriation of assets	N
				Malicious destruction of assets	N
				Forgery	N
				Check kiting	N
				Smuggling	N
				Account take-over/impersonation/etc.	N
				Tax non-compliance/evasion (willful)	N
				Bribes/kickbacks	N
				Insider trading (not on firm's account)	N
				Unauthorized funds transfer	N
				Wire fraud	N
				Money Laundering	N
			Computer Crime (Internal)	Theft of information (w/monetary loss)	N
				Hacking	N
				Manipulation of data	N
				Web page defiance	N
				Inadequate passwords	?
				Firewall breakdown	N
	Employment Practices And Workplace Safety	Losses arising from acts inconstant with employment, health or safety laws or agreements, from payment of personal injury claims, or from diversity/ discrimination events	Employee Relations	Compensation, benefit, termination issues	Y
				Organized labor activity	Y
				Hostile environment	N
				Wrongful termination	?
				Harassment	N
				Libel/Slander/Defamation	N
				Employee illness	?
				Breach of noncompete	N
				Improper discharge	N
			Safe Environment-Workers & Third Party	General liability	N
				Employee health & safety rules events	N
				Workers compensation-Medical	N
				Workers compensation – Indemnity	N
				Accident coverage for employees	N
				Negligent use of autos & other vehicles	N
				Pollution	N
				Other events causing BI or PD to third parties from general operations (not PL)	N

Event-Type Category (Initial Level)	Event-Type Category (Level 1)	Definition	Categories (Level 2)	Activity Examples (Level 3)	Business Risk?
People/Relationship Risk (continued)	Employment Practices And Workplace Safety (continued)		Diversity & Discrimination	**Sexual-based**	N
				Race-based	N
				Age-based	N
				Religion-based	N
				Other Discriminatory Items	N
				Nationality-based	N
	Clients, Products & Business Practices	Losses arising from an unintentional or negligent failure to meet a professional obligation to specific clients (including fiduciary and suitability requirements), or from the nature or design of a product.	Suitability, Disclosure & Fiduciary	Fiduciary breaches/guideline violations	N
				Suitability/disclosure issues (KYC, etc)	N
				Retail consumer disclosure violations	N
				Breach of privacy	N
				Aggressive Sales	Y
				Account churning	N
				Misuse of confidential information	N
				Lender Liability	N
				Breach of contract	N
				Negligent advise	N
				Concealing Losses	N
				Nondisclosure of sensitive issues	N
				Misuse of important information	N
				Unapproved access to accounts	N
			Improper Business or Market Practices	Antitrust	Y
				Improper trade/market practices	Y
				Market manipulation	N
				Insider trading (on firm's account)	N
				Unlicensed activity	N
				Money laundering	N
				Director or Officer negligence	N
				Errors and Omissions	N
				Improper advertising	N
				Copyright infringement	N
				Professional negligence	N
				Merger and Acquisition	N
				Sales Discrimination	N
				Libel	N
			Product Flaws	Product defects (unauthorized, etc)	Y
				Model Errors	Y
			Selection, Sponsorship & Exposure	Failure to investigate client per guidelines	Y
				Exceeding client exposure limits	N
			Advisory Activities	Disputes performance of advisory activities	Y
				Denial of service	N

Event-Type Category (Initial Level)	Event-Type Category (Level 1)	Definition	Categories (Level 2)	Activity Examples (Level 3)	Business Risk?
Process Losses from failed transactions, client accounts, settlements and every day business processes	Execution, Delivery & Process Management	Losses from failed transaction processing or process management, from relations with trade counterparties and vendors	Transaction Capture, Execution & Maintenance	Miscommunication	N
				Data Entry, maintenance or loading error	N
				Missed deadline or responsibility	N
				Model/system misoperation	Y
				Accounting error/entry attribution error	N
				Other task misperformance	N
				Delivery failure	N
				Collateral management failure	Y
				Reference Data Maintenance	N
			Monitoring and Reporting	Failed mandatory reporting obligation	N
				Inaccurate external report (loss incurred)	N
			Customer Intake & Documentation	Client permission/disclaimers missing	N
				Legal documents missing/incomplete	N
			Customer/Client Account Management	Unapproved access given to accounts	N
				Incorrect client records (loss incurred)	N
				Negligent loss or damage of client assets	N
			Trade Counterparties	Non-client counterparty misperformance	N
				Misc. non-client counterparty disputes	N
			Vendors & Suppliers	Outsourcing	Y
				Vendor disputes	Y
Systems Losses arising from disruption of business or system failure due to unavailability of infrastructure or IT	IT and Utilities	Losses arising from disruption of business or system failures	Systems	Hardware breakdown **NOC**	N
				Software breakdown **NOC**	N
				Telecommunication failures	N
				Utility outage/disruptions (**excl telephone**)	N
				DOS	N
				Backup failures	N
				Programming error/bug	N
				Human error	N
				Disruption of vendor services	N
				Computer Virus	N
				Computer Glitch	N
				Incompatible software	N
				UPS failure	N
				Telephone related	N
				Fax-related	N
				Internet Related	N

Event-Type Category (Initial Level)	Event-Type Category (Level 1)	Definition	Categories (Level 2)	Activity Examples (Level 3)	Business Risk?
External/Physical Assets The risk of loss from the actions of third parties, including external fraud, damage to physical property or assets, or from change in regulations that would alter the firm's ability to continue doing business in certain markets.	Damage to or Loss of Assets	Losses arising from loss or damage to physical assets from natural disaster or other events.	Physical Asset Damage	**Storms**	N
				Hurricane/Typhoon/Tornado	N
				Hail	N
				Frost	N
				Flood	N
				Earthquake/Volcanic eruption	N
				Landslide/Mudslide	N
				Avalanche	N
				Fire/Explosion	N
				Lightning	N
				Sprinkler leakage	N
				Overvoltage	N
				Mechanical breakdown	N
				Terrorism	N
				Bomb threat	N
				Collision of aircraft/vehicle/ship/satellite	N
			Political	**War**	N
				Expropriation	N
				Strike/Riot/Civil Commotion	N
				Act of government	N
	External Acts	Losses due to acts of type intended to defraud, misappropriate property or circumvent the law, by a third party	External Fraud	Theft/robbery/**extortion/embezzlement**	N
				Forgery	N
				Check Kiting	N
				Smuggling	N
				Account take-over/impersonation/etc.	N
				Bribes/kickbacks	N
				Misappropriation of assets	N
				Fraud/credit fraud/worthless deposits	N
			Computer Crime (External)	Theft of information (w/ monetary loss)	N
				Hacking	N
				Manipulation of data	N
				Web page defiance	N
				Inadequate passwords	N
				Firewall breakdown	N

Notes: Explanation of Differences from Taxonomy in Annex 2 of the September 2001 Working Paper

1. A new initial level has been created that comprises four Risk Classes: People, Process, Technology, and External/Physical Asset. These four Risk Classes correspond to the current working definition of Operational Risk, as offered by the Bank of International Settlements in the September working paper.

2. All seven level one categories from the Annex 2 structure have been preserved and now "tree up" into one of the four Risk Classes.

3. New items in level three appear in bold type. These items have been added for purposes of specificity.

4. Internal Fraud and External Fraud Categories in Level 1 are renamed Internal Acts and External Acts.

5. Computer Crime (Internal) has been added as a new level two category in Internal Acts.

6. Employment Practices and Workplace Safety has been incorporated into the People Event Type Category.

7. Clients, Products & Business Practices has been incorporated into the People Risk category.

8. Execution, Delivery & Process Management comprises the Process Category.

9. Computer Crime appears in both the Internal and External Acts category.

10. Damage to Physical Assets has been changed to Damage to or Loss of Assets.

11. "Political" is a new level two category in Damage to or Loss of Assets.

12. Business Disruptions and System Failures has been relabelled IT and Utilities.

13. Unauthorized Activity is now also incorporates Trading Misdeeds.

14. Level 3 under "Damage to Physical Assets" category has been expanded to include additional terms for added clarity.

15. Safe Environment ahs been relabelled Safe Environment and Third Party.

16. Disasters and Other Events has been relabelled Physical Asset Damage.

BBB: Bankers Blanket Bond, **CC**: Computer Crime Policy, **CGL**: Commercial Gerenal Liability Policy, **DO**: Directors & Officers Liability Policy, **EI**: Electronic Insurance Policy, **EPL**: Employment Practice Liability Policy, **P**: Property Insurance Policy, **PI**: professional Indemnity Policy, **UT**: Unauthorized Trading Policy

Event-Type Category (Initial Level)	Event-Type Category (Level 1)	Categories (Level 2)	Activity Examples (Level 3)	Effect-type					
				Write-downs	Loss of Recourse	Restitution	Legal Liability	Regulatory& Compliance (including Taxation)	Loss of or Damage to Assets
People/Relationship Risk	Internal acts	Unauthorized Activity/Trading Misdeeds	Transactions not reported (intentional)	UT	UT	-	-	-	-
			Trans type unauthorized (w/monetary loss)	UT	UT	-	-	-	-
			Mismarking of position(intentional)	UT	UT	-	-	-	-
			Insider trading	UT	UT	-	-	-	-
			Frontrunning	UT	UT	-	-	-	-
			Market manipulation	-	-	PI/DO	PI/DO	-	-
			Trading above limits	UT	UT	-	-	-	-
		Theft and Fraud	Fraud/credit fraud/worthless deposits	BBB	BBB	BBB	BBB	-	-
			Theft extortion/embezzlement/robbery	BBB	BBB	BBB	BBB	-	-
			Misappropriation of assets	BBB	BBB	BBB	BBB	-	-
			Malicious destruction of assets	BBB	BBB	BBB	BBB	-	-
			Forgery	BBB	BBB	BBB	BBB	-	-
			Check kiting	BBB	BBB	BBB	BBB	-	-
			Smuggling	BBB	BBB	BBB	BBB	-	-
			Account take-over/impersonation/etc.	BBB	BBB	BBB	BBB	-	-
			Tax non-compliance/evasion (willful)	BBB	BBB	BBB	BBB	-	-
			Bribes/kickbacks	BBB	BBB	BBB	BBB	-	-
			Insider trading (not on firm's account)	-	-	PI	PI	-	-
			Unauthorized funds transfer	BBB	BBB	BBB	BBB	-	-
			Wire fraud	BBB	BBB	BBB	BBB	-	-
			Money Laundering	-	-	PI/DO	PI/DO	-	-
		Computer Crime (Internal)	Theft of information (w/monetary loss)	BBB	BBB	-	-	-	P
			Hacking	BBB	BBB	-	-	-	-
			Manipulation of data	BBB	BBB	-	-	-	-
			Web page defiance	BBB	BBB	-	-	-	-
			Inadequate passwords	BBB	BBB	-	-	-	-
			Firewall breakdown	BBB	BBB	-	-	-	-

BBB: Bankers Blanket Bond, **CC**: Computer Crime Policy, **CGL**: Commercial Gerenal Liability Policy, **DO**: Directors & Officers Liability Policy, **EI**: Electronic Insurance Policy, **EPL**: Employment Practice Liability Policy, **P**: Property Insurance Policy, **PI**: professional Indemnity Policy, **UT**: Unauthorized Trading Policy

Event-Type Categaory (Initial Level)	Event-Type Category (Level 1)	Categories (Level 2)	Activity Examples (Level 3)	Effect-type					
				Write-downs	Loss of Recourse	Restitution	Legal Liability	Regulatory & Compliance (including Taxation)	Loss of or Damage to Assets
	Employment Practices And Workplace Safety	Employee Relations	Compensation, benefit, termination issues	-	-	EPL	EPL	-	-
			Organized labor activity	-	-	EPL	EPL	-	-
			Hostile environment	-	-	EPL	EPL	-	-
			Wrongful termination	-	-	EPL	EPL	-	-
			Harassment	-	-	EPL	EPL	-	-
			Libel/Slander/Defamation	-	-	EPL	EPL	-	-
			Employee illness	-	-	EPL	EPL	-	-
			Breach of noncompete	-	-	EPL	EPL	-	-
			Improper discharge	-	-	EPL	EPL	-	-
		Safe Environment-Workers & Third Party	General liability	-	-	CGL	CGL	-	-
			Employee health & safety rules events	-	-	WC	WC	-	-
			Workers compensation-Medical	-	-	WC	WC	-	-
			Workers compensation – Indemnity	-	-	WC	WC	-	-
			Accident coverage for employees	-	-	WC	WC	-	-
			Negligent use of autos & other vehicles	-	-	WC	WC	-	-
			Pollution	-	-	WC	WC	-	-
			Other events causing BI or PD to 3rd parties from general ops (not Prof Liab)	-	-	WC	WC	-	-
		Diversity & Discrimination	**Sexual-based**	-	-	EPL	EPL	-	-
			Race-based	-	-	EPL	EPL	-	-
			Age-based	-	-	EPL	EPL	-	-
			Religion-based	-	-	EPL	EPL	-	-
			Other Discriminatory Items	-	-	EPL	EPL	-	-
			Nationality-based			EPL	EPL	-	-
	Clients, Products & Business Practices	Suitability, Disclosure & Fiduciary	Fiduciary breaches/guideline violations	-	-	PI/DO	PI/DO	-	-
			Suitability/disclosure issues (KYC, etc)	-	-	PI/DO	PI/DO	-	-
			Retail consumer disclosure violations	-	-	PI/DO	PI/DO	-	-
			Breach of privacy	-	-	PI/DO	PI/DO	-	-
			Aggressive Sales	-	-	PI/DO	PI/DO	-	-
			Account churning	-	-	PI/DO	PI/DO	-	-
			Misuse of confidential information	-	-	PI/DO	PI/DO	-	-
			Lender Liability	-	-	PI/DO	PI/DO	-	-
			Breach of contract	-	-	PI/DO	PI/DO	-	-
			Negligent advise	-	-	PI/DO	PI/DO	-	-

BBB: Bankers Blanket Bond, **CC**: Computer Crime Policy, **CGL**: Commercial Gerenal Liability Policy, **DO**: Directors & Officers Liability Policy, **EI**: Electronic Insurance Policy, **EPL**: Employment Practice Liability Policy, **P**: Property Insurance Policy, **PI**: professional Indemnity Policy, **UT**: Unauthorized Trading Policy

Event-Type Categaory (Initial Level)	Event-Type Category (Level 1)	Categories (Level 2)	Activity Examples (Level 3)	Effect-type					
				Write-downs	Loss of Recourse	Restitution	Legal Liability	Regulatory & Compliance (including Taxation)	Loss of or Damage to Assets
			Concealing Losses	-	-	PI/DO	PI/DO	-	-
			Nondisclosure of sensitive issues	-	-	PI/DO	PI/DO	-	-
			Misuse of important information	-	-	PI/DO	PI/DO	-	-
			Unapproved access to accounts	-	-	PI/DO	PI/DO	-	-
		Improper Business or Market Practices	Antitrust	-	-	DO	DO	-	-
			Improper trade/market practices	-	-	PI/DO	PI/DO	-	-
			Market manipulation	-	-	PI/DO	PI/DO	-	-
			Insider trading (on firm's account)	-	-	PI/DO	PI/DO	-	-
			Unlicensed activity	-	-	PI/DO	PI/DO	-	-
			Money laundering	-	-	PI/DO	PI/DO	-	-
			Director or Officer negligence	-	-	PI/DO	PI/DO	-	-
			Errors and Omissions	-	-	PI/DO	PI/DO	-	-
			Improper advertising	-	-	PI/DO	PI/DO	-	-
			Copyright infringement	-	-	PI/DO	PI/DO	-	-
			Professional negligence	-	-	PI/DO	PI/DO	-	-
			Merger and Acquisition	-	-	PI/DO	PI/DO	-	-
			Sales Discrimination	-	-	PI/DO	PI/DO	-	-
			Libel	-	-	PI/DO	PI/DO	-	-
		Product Flaws	Product defects (unauthorized, etc)	-	-	PI	PI	-	-
			Model Errors	-	-	PI	PI	-	-
		Selection, Sponsorship & Exposure	Failure to investigate client per guidelines	-	-	PI/DO	PI/DO	-	-
			Exceeding client exposure limits	-	-	PI/DO	PI/DO	-	-
		Advisory Activities	Disputes over perfomance of advisory activities	-	-	PI	PI	-	-
			Denial of service	-	-	PI	PI	-	-
Process	Execution, Delivery & Process Management	Transaction Capture, Execution & Maintenance	Miscommunication	-	-	PI	PI	-	-
			Data Entry, maintenance or loading error	-	-	PI	PI	-	-
			Missed deadline or responsibility	-	-	PI	PI	-	-
			Model/system misoperation	-	-	PI	PI	-	-
			Accounting error/entry attribution error	-	-	PI	PI	-	-
			Other task misperformance	-	-	PI	PI	-	-
			Delivery failure	-	-	PI	PI	-	-
			Collateral management failure	-	-	PI	PI	-	-
			Reference Data Maintenance	-	-	PI	PI	-	-

BBB: Bankers Blanket Bond, **CC**: Computer Crime Policy, **CGL**: Commercial Gerenal Liability Policy, **DO**: Directors & Officers Liability Policy, **EI**: Electronic Insurance Policy,
EPL: Employment Practice Liability Policy, **P**: Property Insurance Policy, **PI**: professional Indemnity Policy, **UT**: Unauthorized Trading Policy

Event-Type Category (Initial Level)	Event-Type Category (Level 1)	Categories (Level 2)	Activity Examples (Level 3)	Effect-type					
				Write-downs	Loss of Recourse	Restitution	Legal Liability	Regulatory & Compliance (including Taxation)	Loss of or Damage to Assets
		Monitoring and Reporting	Failed mandatory reporting obligation	-	-	DO	DO	-	-
			Inaccurate external report (loss incurred)	-	-	DO	DO	-	-
		Customer Intake & Documentation	Client permission/disclaimers missing	-	-	PI	PI	-	-
			Legal documents missing/incomplete	-	-	PI	PI	-	-
		Customer/Client Account Management	Unapproved access given to accounts	-	-	PI	PI	-	-
			Incorrect client records (loss incurred)	-	-	PI	PI	-	-
			Negligent loss or damage of client assets	-	-	PI	PI	-	-
		Trade Counterparties	Non-client counterparty misperformance	-	-	PI	PI	-	-
			Misc. non-client counterparty disputes	-	-	PI	PI	-	-
		Vendors & Suppliers	Outsourcing	-	-	PI	PI	-	-
			Vendor disputes	-	-	PI	PI	-	-
Systems	IT and Utilities	Systems	Hardware breakdown **NOC**	-	-	-	-	-	P
			Software breakdown **NOC**	-	-	-	-	-	-
			Telecommunication failures	-	-	-	-	-	P
			Utility outage/disruptions	-	-	-	-	-	P
			(**excluding telephone**)	-	-	-	-	-	P
			DOS	-	-	EI	EI	-	P
			Backup failures	-	-	-	-	-	P
			Programming error/bug	-	-	-	-	-	P
			Human error	-	-	-	-	-	P
			Disruption of vendor services	-	-	-	-	-	P
			Computer Virus	-	-	-	-	-	P
			Computer Glitch	-	-	-	-	-	P
			Incompatible software	-	-	-	-	-	P
			UPS failure	-	-	-	-	-	-
			Telephone related	-	-	-	-	-	-
			Fax-related	-	-	-	-	-	-
			Internet Related	-	-	EI	EI	-	-

BBB: Bankers Blanket Bond, **CC**: Computer Crime Policy, **CGL**: Commercial Gerenal Liability Policy, **DO**: Directors & Officers Liability Policy, **EI**: Electronic Insurance Policy, **EPL**: Employment Practice Liability Policy, **P**: Property Insurance Policy, **PI**: professional Indemnity Policy, **UT**: Unauthorized Trading Policy

Event-Type Categaory (Initial Level)	Event-Type Category (Level 1)	Categories (Level 2)	Activity Examples (Level 3)	Effect-type					
				Write-downs	Loss of Recourse	Restitution	Legal Liability	Regulatory & Compliance (including Taxation)	Loss of or Damage to Assets
External/Physical Assets	Damage to or Loss of Assets	Physical Asset Damage	**Storms**	-	-	-	-	-	P
			Hurricane/Typhoon/Tornado	-	-	-	-	-	P
			Hail	-	-	-	-	-	P
			Frost	-	-	-	-	-	P
			Flood	-	-	-	-	-	P
			Earthquake/Volcanic eruption	-	-	-	-	-	P
			Landslide/Mudslide	-	-	-	-	-	P
			Avalanche	-	-	-	-	-	P
			Fire/Explosion	-	-	-	-	-	P
			Lightning	-	-	-	-	-	P
			Sprinkler leakage	-	-	-	-	-	P
			Overvoltage	-	-	-	-	-	P
			Mechanical breakdown	-	-	-	-	-	P
			Terrorism	-	-	-	-	-	P
			Bomb threat	-	-	-	-	-	P
			Collision of aircraft/vehicle/ship/satellite	-	-	-	-	-	P
		Political	**War**	-	-	-	-	-	-
			Expropriation	-	-	-	-	-	-
			Strike/Riot/Civil Commotion	-	-	-	-	-	-
			Act of government	-	-	-	-	-	P
	External Acts	External Fraud	Theft/robbery/**extortion/embezzlement**	BBB	BBB	BBB	BBB	-	P
			Forgery	BBB	BBB	BBB	BBB	-	-
			Check Kiting	BBB	BBB	BBB	BBB	-	-
			Smuggling	BBB	BBB	BBB	BBB	-	-
			Account take-over/impersonation/etc.	BBB	BBB	BBB	BBB	-	-
			Bribes/kickbacks	BBB	BBB	BBB	BBB	-	-
			Misappropriation of assets	BBB	BBB	BBB	BBB	-	-
			Fraud/credit fraud/worthless deposits	BBB	BBB	BBB	BBB	-	-
		Computer Crime (External)	Theft of information (w/ monetary loss)	CC	CC	-	-	-	-
			Hacking	CC	CC	-	-	-	-
			Manipulation of data	CC	CC	-	-	-	-
			Web page defiance	-	-	-	-	-	-
			Inadequate passwords	-	-	-	-	-	-
			Firewall breakdown	-	-	-	-	-	-

Annex 4: Description of Major Insurance Products for Operational Risks

Insurance Product	General Description of Coverage
Bankers Blanket Bond or Financial Institution Bond (BBB)	a) Direct financial loss arising from dishonest or fraudulent act employee, b) Direct financial loss due to theft of money or securities on premises or while in transportation, and c) Direct financial loss due to counterfeiting, alteration, or forgery of bills, securities, or signatures.
Computer Crime Policy (CC)	a) Direct financial loss arising from alteration, destruction, or forgery of electronic data, b) Direct financial loss arising from alteration of computer programs, c) Direct financial loss arising from computer virus, d) Direct financial loss arising from false instructions for remittance by fax, telex, TWX, etc., and e) Direct financial loss arising from false voice initiated instructions for remittance.
Unauthorised Trading Policy (UT)	Direct financial loss arising from unauthorised trading executed by a trader for a bank's own account.
Property Insurance Policy (P)	Physical damage claim for loss of or damage to the insured (tangible) property caused by fire, lightening, explosion, collision, leakage of water and natural hazards.
Business Interruption Policy	Loss of profit and increase in cost working due to the suspension or interruption of business resulting from damage to the insured (tangible) property caused by fire, lightening, explosion, collision, leakage of water and natural hazards.
Bankers Professional Indemnity or Errors & Omissions Policy (PI)	Liability or compensating damages and/or financial loss resulting from the acts of officers/employees in the course of providing financial services to customers.
Commercial General (comprehensive) Liability Policy (CGL)	a) Legal liability resulting from the institution inflicting a personal injury on a third party from an accident occurring in the course of business, and b) Legal liability resulting from the institution inflicting property damage on a third party from an accident occurring in the course of business.
Employment Practice Liability Policy (EPL)	Legal liability resulting from the institution committing a "wrongful employment practice" including discrimination, harassment and/ or termination (financial loss cover)
Directors and Officers Liability Policy (DO)	Legal liability resulting from the wrongful actions of directors and officers, including misrepresentation, mismanagement or material errors or omissions in the disclosure of financial information as respects their organisation
Electronic Insurance Policy (EI)	Legal liability resulting from "internet related" electronic activities of the insured (website, e-mail) including libel, slander and defamation, infringement of copyright or trademark, invasion of privacy, breach of security and inadvertent virus transmission into a third parties' computer systems.

The above offers general descriptions of coverages afforded through policies by groups of standard product categories. Actual policies will vary.

Annex 5: Credit Risk

This section analyzes the components of credit risk imbedded in the use of insurance as substitute of capital under the new capital accord and has to be understood in the context of the overall document. Also highlighted further issues such as permanency of contracts, reinsurance and liquidity of settlement.

The credit risk is equal to the default risk of the companies offering the Qualifying Insurance Contracts ("QIC"). The regulatory framework needs to balance the needs to eliminate any additional systemic risk and yet encourage financially strong insurance companies to enter into long term contracts with their banking clients.

An obvious way of implementing a credit haircut would be based on default probabilities published by rating agencies. The default rates in conjunction with credit limits and recovery rates require a portfolio approach to determine the haircut. Whereas in our case it is not likely that there is a meaningful portfolio. Therefore, we recommend that the approach taken is to determine the haircut attached to single credit lines, i.e., insurance companies.

The problem of credit discount can be expressed as follows. Consider a bank with a given operational risk capital and an insurance policy P, what will be the resulting capital charge as a result of insurance policy taking into account the credit worthiness of the insurer.

An analytic solution to the problem is provided by the LDA (loss distribution approach) framework. In this case, the *gross capital* is defined as the unexpected loss corresponding to the distribution of aggregate loss S_{agg} . To include the impact of insurance, we proceed in two steps.

First assume a default probability of zero for the insurer, i.e., no credit risk of insurer. In this case, the *net capital* after the insurance is determined by means of the distribution of post-insurance aggregate loss S_{agg}^{post} .

In order to incorporate the credit quality of the insurer, we assume the worst case scenario of zero recovery. In this case, the net capital is obtained from the distribution of:

$$S = (1 - p_d) S_{agg}^{post} + p_d \, S_{agg} , \qquad (1)$$

where p_d is the default probability of the insurer.

The previous considerations suggest that the following can be a more practical implementation of credit haircut:

$$K_N = K_G - K_{RT} \times (1 - r) \qquad (2)$$

K_N Net capital (net of insurance)

K_G Gross capital

K_{RT} Capital relief as a result of risk transfer (no credit risk)
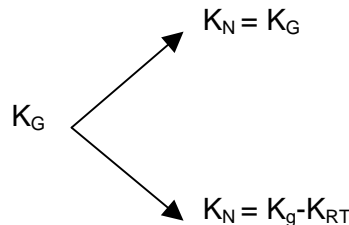
$1 - r$ Credit risk discount factor

A simple realisation of this can be achieved by introducing a floor. Thereby a "hurdle rate" is specified either:

a) in absolute terms, e.g., "BB or above", or
b) in relative terms, namely only insurers of equal or better ratings relative to a bank.

An absolute approach, whilst simple could, if set too high, restrict the market.

The relative approach, whilst more flexible, could create disruption during the term of a policy if the bank were to be up/down graded. In addition, we see no reason why a highly rated bank should be penalised by being restricted to a smaller market of insurers.

In either case the introduction of a hurdle rate will result in a credit discount to be described as follows. Insurers with a rating above the hurdle in equation 2 will have $r = 0$, i.e., full credit is given to the insurer's limit assuming remoteness of default. Whereas for the other insurer we have $r = 1$, i.e., the insurer is assumed to have a very high default probability. The hurdle rate approach can be expressed by the following binary tree:

$$
\begin{array}{ccc}
 & & K_N = K_G \\
 & \nearrow & \\
K_G & & \\
 & \searrow & \\
 & & K_N = K_g - K_{RT}
\end{array}
$$

An alternative approach is obtained by explicitly including the credit rating of the insurer in the determination of the discount factor. To do so, we suggest the use of standard table prescribed by the Committee for corporate exposures.

This suggest the following *preliminary* credit discount factor:

$$r = \text{Risk weight factor} \,.$$

The regulatory approach, however, in addition to risk weights, assumes a diversification factor of 8% for banks. The question arises whether and to what extent such a factor can be applied to the current approach. There are two reason in support of a diversification factor. One being the diversification benefit resulting from participation of various insurers. The other being the diversification within the risk portfolio of each insurer itself.

Hence, to include the diversification benefit we suggest:

$$1 - r = \left(1 - \text{Risk weight factor}\right) \times r_{div} \,,$$

where r_{div} denote the degree of the diversification benefit. The question as to the actual value of r_{div} should take the following into account. A basket of insurance names is not as well diversified as the banking industry's average credit portfolio which has at least seven other defined asset classes beside corporate names. In addition, the insurance industry only represents a small part of the corporate universe.

We believe that it would be justified to apply a higher value of r_{div} than 8%, but we feel that this problem could be better addressed by the stipulation of minimum criteria.

Insurance is founded on the principle of risk and loss sharing. Each takes a share of the risk and liability but on a stand-alone basis. Therefore it is appropriate that the credit risk taken on shares taken by each insurer (and where applicable reinsurer) are separately calculated.

The alternative approach would be a group weighted average discount. It is unlikely that would be a simpler process especially where relief was being sought on a programme with a number of layers of protection. It is also likely that the true "risk" embedded in trhe programme would be less rather than more transparent. A group approach might also reduce the flexibility of the bank to replace insurance companies on their programmes.

For the rating matrix we propose to rely on the public rating of the insurance companies as up to 90% of the major P&C and Reinsurance companies carry at least one or several public ratings.