

IAA Risk Book

Chapter 1 - Introduction to the IAA Risk Book

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1. Introduction/Overview

The IAA Risk Book provides a set of high quality reference materials for use in managing the uncertainty of insurer risks. The IAA's aim in developing these materials is to help ensure both the sustainability of insurance programs and the protection of their policyholders.

This chapter of the Risk Book is organized into the following sections:

2. Opportunities
3. Challenges
4. Solutions
5. Stakeholder Tools – Supervisors
6. Stakeholder Tools – Insurers
7. Emerging Actuarial Tools and Processes
8. Conclusion

The terms “insurance regulator” and “insurance supervisor” are sometimes used inter-changeably despite some real differences in function. For ease of communication, this chapter uses the term “supervisor” (i.e., as in International Association of Insurance Supervisors) unless the term “regulator” is clearly more appropriate.

2. Opportunities

Historically, actuaries have played many important roles for providers of insurance (e.g., pricing, product design, valuation, and risk and capital management). In addition, the actuaries have provided a unique and central interface between supervisors and the providers of insurance coverage to ensure both the sustainability of insurance programs and the protection of policyholders.

The actuarial profession has contributed significantly to the development of risk management tools and processes, both within and outside the insurance industry. Actuarial practice continues to improve the understanding, measurement and communication of risk and its implications through the development of tools (and increasingly processes) to manage the uncertainty of risk in a sustainable and transparent fashion. These tools and processes aim to trace, manage and mitigate the acceptance and transmission of the uncertainty of risk, perhaps serving in a similar aspirational capacity to the way that accounting debits and credits trace the acceptance and transmission of cash. This allows industry stakeholders, including actuaries, supervisors and management, to clarify risk exposures, recognize their sensitivities and provide sustainable, ongoing, management oversights.

The 2007-08 Global Financial Crisis (GFC) demonstrated that the world's financial systems, including both corporations and supervisors, need better processes to facilitate the effective

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provision of sustainable risk taking and risk pooling. Clarifying the necessary framework developed for insurance may also have relevance for other components of the financial system.

In 2004, before the GFC, the International Actuarial Association (IAA) published “**A Global Framework for Insurer Solvency Assessment**”. Originally prepared for the International Association of Insurance Supervisors (IAIS), this book explored the elements needed for an international capital standard for insurers and provided a “best practice” approach available to all supervisors. It dealt with methods supervisors might use to assess insurers’ current financial position, as well as to understand the range of their possible future financial positions.

This Risk Book adds to the IAA’s 2004 work, as well as lessons learned from the GFC, by addressing professional developments in the areas of governance, management and regulation of insurance risks. These processes are needed to enable sustainable management of the uncertainties of pooled risks. They constitute part of the internal franchise value and intellectual capital of the company, as essential as economic capital is for ensuring sustainability. Each chapter in the Risk Book highlights key messages of interest to boards, senior management, financial analysts, actuaries, and supervisors. These messages apply to both established and evolving structures for pooling risk. Each chapter is valuable as a solo tool, but their real value comes from applying multiple tools simultaneously and taking advantage of their synergies and implications to (and uses in addressing) the larger challenges of the financial system.

3. Challenges

The governance, management and regulation of insurance risk are faced with a number of challenges.

1. **Market complexity** – The financial markets within which insurance operates are complex. A “simplified” map of the financial market inter-relationships is included at the end of this chapter. The financial markets continually evolve as participants strive to remain competitive. This evolution fuels the birth and transformation of financial products such as banking, insurance and financial instruments. This stretches and reshapes the boundaries of conventional wisdom as to which products should be categorized as insurance, banking or securities. This evolution of financial products, including insurance, is healthy but at the same time represents challenges to: 1) supervisors attempting to fulfill their mandates; 2) insurers attempting to fulfill promises and achieve success for their stakeholders and 3) financial product consumers attempting to manage their financial needs (e.g., protection, investment and financing).
2. **Uncertainty of risk** – Unlike auditable cash and inventory, the assessment of risk is incomplete without addressing the underlying uncertainty. Claims are subject to uncertainty as to their level, trend, timing and volatility. The assets used to fund these future claims will also have risks associated with their ultimate value, especially for life insurers. The manner in which different risks will interact or be dependent on each other and on a common set of circumstances (e.g., scenario or stress) can also be uncertain. Although the measurement of the effects of past events can be an important basis for assessing the future, conditions can change in ways that cannot be predicted from past experience. As a result, past experience is not necessarily predictive of future experience.

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How to exercise sound judgment in a dynamic environment with the use of tools and techniques is the focus of much of this collection of chapters¹.

3. **Many dimensions of insurer risks** – Governing, managing and regulating insurer risks is challenging due to the many dimensions of those risks. For example, a partial list of some of the dimensions includes:
- a. Presence of credit, market, insurance and operational risks (among others)
 - b. Insurance product guarantees which can last for decades or lifetimes
 - c. Presence of substantive policyholder options (e.g., withdrawal, renewal and resets)
 - d. The nature of insurance products which tend to be a liability driven business requiring careful attention to asset liability management, notably for life insurers
 - e. The variation in coverage type; some insurer risks have loss distributions skewed to their tails (e.g., catastrophic earthquake insurance) while others have more “normal” distributions (e.g., group dental).
 - f. The nature and scope (and size) of non-life insurance risks continually change, such that data from a few years ago may not be fully relevant to current risks, and the type of risk can vary greatly from one product to another. Hence there tends to be a shortage of sufficient data to get precise measures of the risk before the risk changes. In addition, the data for one product is generally not relevant to another product.
 - g. The need to consider the integrated effect of all an insurer’s risks, at both the entity and the group level when considering an insurance group. This means allowing for such factors as synergistic effects, diversification, fungibility constraints and liquidity needs.

As a result of these challenges, there is no single risk measure that provides sufficient information for the governance, management and regulation of insurance operations. Multiple tools are required to provide sufficient perspective.

Currently, the Financial Stability Board and the International Association of Insurance Supervisors (IAIS) are facing the substantial difficulties involved in creating a global Insurance Capital Standard (ICS) for insurance. This is due, in part, to the challenges inherent in the governance, management and regulation of an insurer’s risks. For example, the development of the ICS and capital requirement in various jurisdictions has focused on the merits and challenges of standardized approaches versus internal models. Both approaches have important benefits and shortcomings².

¹ An important contrast between banking and insurance is that insurers use these tools to estimate, report on, and manage their liabilities of unknown value in comparison with the usually straightforward market value determination of their assets. Banks have the reverse situation -- the value of their liabilities (deposits) is easily known, but the value of their assets is not. Thus, banks have applied some of these tools and techniques to their assets (such as loans made to individuals and businesses), without, unless specified by their regulators, of a consistent professional approach and methodology that are effectively integrated into their regulatory framework.

²A common approach will assume a frequency/severity model (or one based on frequency and/or timing) for calculating all risks. While applicable to most life and pension coverages, and for many non-life (property and casualty) offerings, each coverage and loss type can have its own frequency and severity distribution. In practice, for products with multiple loss types/coverages, the focus is generally on aggregate loss estimates over all loss types, not the individual “odds” or probabilities for frequency and severity (which may never be explicitly calculated for some products).

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Standardized approaches have the advantage that they are based on industry averages and consistent shocks (perhaps applied through factors multiplied by financial statement amounts) to all insurers, thereby achieving a form of apparent comparability. The disadvantage of standardized approaches is that by design they will not capture the specifics of an individual insurer's risks or the way in which those risks are managed and mitigated. An internal model approach enables the specifics of the risks faced by each insurer to be considered and modeled directly. Supervisors, however, face the challenge of making appropriate assessments of the models, their calibration, their validation, their governance and their use when internal models are used. In addition, supervisors are faced with the challenge of cross-insurer comparability of methods and key assumptions.

The need for multi-dimensional perspectives of an insurer's risks is illustrated by the use by insurers and supervisors of both the insurer's current financial position (e.g., point in time capital requirements), and its projected future financial condition, informed by processes such as ORSA or stress testing.

In the popular movie *Toy Story*, Buzz Lightyear says "To infinity and beyond". The chapters of the IAA Risk Book address the challenge "To future uncertainty and beyond". They provide a description of the tools and processes available to supervisors, insurers and actuaries to estimate and effectively manage pooled risks in a sustainable manner. The IAA hopes that these tools will be applied beyond their historically successful micro-applications (focused on the sustainability of individual insurance organizations) to also be of significant value to the macro issues involving the intersection of insurance, banking and other financial services.

4. Solutions

The actuarial profession is strategically positioned to contribute to and advance the development of risk management tools due to its emphasis on ensuring sustainable pooling of risk for all stakeholders. The aspects of the profession that contribute to making this possible include:

- A widely recognized body of learning derived from research, education, training and practical experience at a high level;
- Specialized and general knowledge and skills;
- Adherence to high ethical and technical standards;
- Being subject to a formal disciplinary process; and
- A self-declared professional mission to consider and contribute to the needs of the public beyond its members' personal gain.

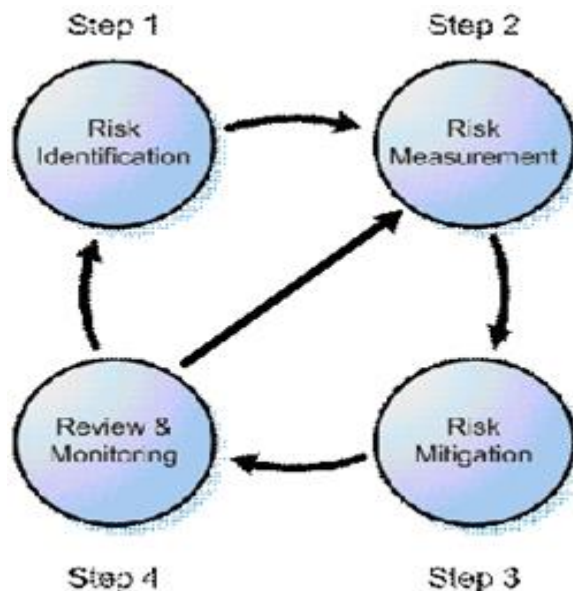
From this foundation, actuaries have developed globally recognized skills and expertise to help ensure the long run sustainability of pooled risk ventures and arrangements. These open-ended problems, while complex, are manageable if approached in a disciplined and thoughtful manner.

Historically actuarial work with regard to the balance sheet largely involved developing reliable point-in-time numbers to report to stakeholders. Stakeholders, however, need more – they need to have the implications embedded in those numbers explained clearly, including the limitations of the underlying models, and they need to recognize that management understands the risks involved and is taking prudent steps to mitigate those risks. Risk management is the umbrella term used to describe identifying, managing (mitigating), and communicating all inherent risks and uncertainties not just those inherent in financial reporting.

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The actuarial profession has stepped up to this challenge and undertaken pioneering research to develop risk management methodologies and processes. Some of these efforts are addressed in this Risk Book. It highlights tools and processes used by the various stakeholders to identify, manage, and report on risk which are at the heart of the actuarial approach to risk management, such as the actuarial control cycle³.

DEPICTION OF THE ACTUARIAL CONTROL CYCLE



5. Stakeholders Tools – Supervisors

The terms “insurance regulator” and “insurance supervisor” are sometimes used inter-changeably despite some real differences in function. For ease of communication, this chapter has used the term “supervisor” (i.e., as in International Association of Insurance Supervisors) unless the term “regulator” is clearly more appropriate. In reality there are two separate functions – the regulatory function may set out rules and regulations to be applied by insurers, while the supervisory function may focus on assessing compliance with applicable laws and regulations and carrying out such monitoring/intervention as are necessary and allowed for under the supervisor’s powers. Many supervisory authorities also have regulatory powers. Jurisdictions may choose to retain legislative control over certain matters rather than fully delegate this power to the insurance supervisory authority.

³ A colloquial (i.e. Wikipedia derived) definition for the **actuarial control cycle** is a set of specific activities that involves the application of actuarial techniques to real world business problems. The actuarial control cycle requires a professional within that field (i.e., an [actuary](#)) to specify a problem, develop a solution, monitor its consequences, and repeat the process.^[1] Actuarial organizations worldwide are increasingly integrating the actuarial control cycle into their examination/qualification processes as a framework that helps to define actuarial projects. https://en.wikipedia.org/wiki/Actuarial_control_cycle Also, see diagram (x) at the end of this paper. This cycle has been the foundation for emerging actuarial professional processes for ERM and Model Governance that will be further discussed in this Risk Book. It is also a standard engineering concept used in many traditional engineering fields.

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A forthcoming chapter of this Risk Book - Resolution (of insolvencies) – is particularly germane to this topic. Although it is a detailed exposition by a UK actuary of the resolution process in the UK, the principles outlined are applicable globally.

A supervisor’s authority to act stems from the enabling legislation of their jurisdiction. Such legislation will identify the nature of the powers granted as well as the scope of the entities subject to supervision. For example, one supervisor’s enabling legislation includes the statement that their object is to “supervise financial institutions in order to determine whether they are in sound financial condition and are complying with their governing statute law and supervisory requirements under that law”. Other supervisory powers that may be granted by enabling legislation might include market conduct, resolution, licensing and systemic risk monitoring. Each jurisdiction will assign these powers (or others) among one or more supervisory bodies.

Insurance supervisors exercise their powers through a variety of tools that cover the spectrum from “must comply” with regulations (“hard” tools) to moral suasion (“soft” tools). Some examples of the harder and softer tools⁴ include:

1. Harder tools:
 - a. Regulations (i.e., “must comply” – some jurisdictions also have other tools or use other names such as “guidelines” which may be a “hard” tool in some jurisdictions or a “soft” tool in others);
 - b. Valuation and capital requirements;
 - c. Statutory actuarial roles;
 - d. Disclosure requirements, both public (such as financial reporting standards) and private (such as the ORSA);
 - e. Intervention powers, including the ability to require changes to the insurer’s plans and strategies to reduce its risk profile and improve its capital position, as well as to require the preparation of recovery and/or resolution plans (See Chapter [E] on Resolution for a through discussion of this tool);
 - f. Quantitative assessments – were certain financial components determined correctly or are they within standards;
 - g. Examination authority and authority to fine; and
 - h. Authority to prohibit or restrict certain operations or transactions.
2. Softer tools:
 - a. Supervisory framework – the process by which the supervisory authority will assess the insurers under its jurisdiction;

⁴ Many of these tools are also used by banking supervisors, but their perspective and purpose may differ. For example, the time horizon for identifying and addressing a banking crisis may be a matter of days, while for insurance it may be many months or years. In addition, once intervention actions are needed, the banking supervisor often has complete fungibility to move capital throughout a series of legal entities within a group, while the insurance supervisor may need to freeze all funds in related entities.

- b. Manner in which professionals such as actuaries and auditors (with their professional practice standards and discipline processes) are either relied upon or used (i.e., “trust but verify”);
- c. Supervisory intensity – instead of supervisory reliance only on a submission of materials, there is the option to include considerable in-depth review by supervisory staff (especially those skilled in actuarial matters), along with regular in-person discussions with insurer staff);
- d. Moral suasion – works best in a climate of mutual trust and respect;
- e. Qualitative assessments – e.g., covering the effectiveness of governance and the actuarial function;
- f. Ability to collaborate with and learn from other supervisors as part of supervisory cooperation and coordination (e.g., supervisory colleges); and
- g. In depth discussions with management and access to private corporate information.

6. Stakeholders Tools - Insurers

There is a suite of tools (often enhanced by actuarial standards) that is often used by insurers (depending on their scale, breadth and complexity) to meet the competing needs of the various stakeholders (e.g., shareholders, policyholders, supervisors and customers) for the effective governance of insurer risks (identification, management and communication). These include:

1. Enterprise Risk Management (ERM) concepts such as risk governance, appetite, limits and controls;
2. Use of risk experts, with those from a profession (especially actuaries) being perhaps the most valuable;
3. Effective control functions for actuarial matters, risk management and audit, including how they are organized to address governance of internal models (especially their control and validation), which may include a version or variation of what is currently described as “three lines of defense”;
4. Appropriate use of management tools such as reinsurance, both proportional and non-proportional (see chapters 6 and 7), hedging investment risks, and asset liability matching techniques (which will be addressed in upcoming chapters);
5. Current financial position assessment, which may involve consistent valuation of balance sheet items and an assessment of additional capital needs and regulatory capital requirements;
6. Future financial condition analysis including the ORSA process (which will also be addressed in an upcoming chapter);
7. Models, including both external vendor models and models developed internally, which include financial, catastrophe (“cat”) and economic capital models;
8. Stress and scenario testing;
9. Responsible pricing, product design and inforce management;
10. Voluntary disclosures to both shareholders and policyholders; and

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11. Traditional corporate management processes such as disaster recovery, strategic planning, compensation philosophy and market positioning.

The underlying challenge with this multiplicity of tools is that while each tool is important, the sheer number of such tools can create confusion within the insurer and reduce focus on the important risks involved. Not only can these tools be viewed as being redundant, rather than complementary, but the substantive cost of maintaining these tools will need to be justified. In addition, it is possible that the key messages from the different tools will be confusing or even lead to incorrect conclusions without proper orchestration of the tools and their results. Actuaries have a unique perspective to understand the many dimensions of risk. This allows them to be able to develop the key messages provided by the combination of risk tools available to the insurer. The actuarial function frequently works closely with the Chief Risk Officer (CRO) in these matters to help ensure that all policyholder promises and obligations are met, while also meeting shareholder expectations (e.g., profitability and sustainability).

The financial statements (balance sheet and income statement) are where serious mismanagement issues are ultimately revealed. As a result, management typically focuses on identifying and managing the leading indicators of risk *before* they arrive on the financial statements. Sometimes this can be achieved through mitigation techniques such as reinsurance, product design, group structures and hedging. At other times management identifies and measures risk and sets limits of acceptable risk through an ERM process. A key to understanding these topics is that each tool mitigates some, but not all, risks. In this Risk Book, we will clarify which risks each tool is best suited for, what residual risks will remain, and what might lead these residual risks to become material.

7. Actuarial Tools and Processes

The IAA has created this Risk Book to provide insight into existing actuarial tools and processes and the synergistic value of their integrated use. The IAA also hopes the Risk Book will accelerate the development of, and added value arising from, emerging actuarial tools and processes, including:

1. **Roles and functions of the actuary** - There has been a growing global recognition of the role and importance of the actuarial function within insurers. Increasingly, supervisors recognize the actuarial function as a control function. Despite this recognition, uncertainties may remain over the important features of an effective actuarial function. This is explored further in chapter 2.

As an example of various roles and functions, twenty five years ago in the United States, two actuarial roles were written into its statutory reporting requirements to address the inherent conflict between the use of factors and professional judgement. For life insurance products, the role of the actuary was to express an opinion and write a report (subject to both supervisory and regulatory requirements and to actuarial standards) that identified any risks that were missed by factor reserves and to increase the reserves, if needed. The role of general insurance actuaries was to opine on the “reasonableness” of the recorded claim liabilities (i.e., whether the recorded number fell within the range of possible estimates that the actuary considered reasonable). This was an explicit supervisory acknowledgement that the uncertainty inherent in such an estimate allows for a range of “reasonable” estimates. The actuarial role today is well suited to further

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expand on this concept of reasonable ranges for the uncertain future, while also recognizing that any estimates and/or ranges cannot be guaranteed to be “sufficient” in all possible scenarios. In both cases, the actuary provides a more relevant risk context to an accounting number that may be subject to inappropriate interpretation without that context. By so doing, the tools used to estimate and manage risk can reveal and address the level of uncertainty/volatility that may accompany these estimates.

2. **Internal models** - It is increasingly recognized that internal models are an important part of insurer risk and capital management. However, their use is frequently subject to a mistrust reflected in a commonly referred to saying by George Box that “essentially, all models are wrong but some are useful”. There can also be a concern that a “mark-to-model” mentality may result in management and boards not recognizing unmodelled risks or the limitations of the internal models. An important element in fostering confidence in the results of internal models is the development of effective governance processes for such models and their assumptions. An upcoming chapter of the Risk Book is devoted to this topic as are standard setting projects at the IAA and the US Actuarial Standards Board.
3. **ERM** - An emerging focus of the profession has been to identify the key processes needed for sustainable risk management. This has resulted in the development of standards for actuaries practicing in an ERM role (such as those adopted in the United States, and the model standards addressing ERM processes being developed by the IAA). This professional focus addresses many of the gaps and criticisms of the historical focus solely on financial statements (which can be backward looking by their very nature and hence poor at providing helpful forward looking assessments). The value of the forward looking aspects of ERM has recently been recognised in supervisory requirements on insurers’ Own Risk and Solvency Assessment (ORSA). A forthcoming chapter of the Risk Book focuses on ORSA and the actuarial involvement in this important tool and process.
4. **Integrating micro and macro tools** - There has been a post-financial crisis development to better understand and communicate insights on interconnectedness, aggregation and systemic implications. We identify and suggest briefly how some of the micro tools discussed in this Risk Book may have relevance to macro needs. We hope that further elaboration will be developed by means of collaboration with others. Possible topics include:
 - a. Time horizon of risk - How can we best incorporate the time dimension over which risk exposures are manifested, as well as for corrective action(s) that can/will be taken? What does risk look like one month, one year and three to five years into the future? What tools and processes are needed to address the longer time horizon inherent in many insurance risks? This will require addressing risk across various business models with different relative risk exposures and time horizons. We need to develop additional tools for this purpose.
 - b. Correlations - How to assess the extent of the correlations between risks, especially how they change in stressed times compared to normal times?
 - c. Capital requirements and process requirements - We have tended to address risk by cataloguing/aggregating all risks into risk factors (or models) to calculate required

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capital. However, while some risks can be mitigated by capital, others are better mitigated through improved processes. Since processes are the elements that create and maintain franchise value (separate from the balance sheet measurement of specific assets and liabilities), can we develop supervisory requirements that lead to reduced process risk exposures?

- d. *Stress testing* - We develop capital requirements based on stress testing and scenario testing. These requirements are based on a defined risk tolerance and presumed risk distribution. As a process, what are standardized languages and terms we could use to facilitate comparability across firms and sectors?
- e. *Interconnectedness tools* - Can we use network theory or other tools to build visual risk maps to better reflect and communicate the character and dependencies of risk instead of our traditional reliance on spreadsheets and pages of text? Can the map show a systemic landscape of risks and their current linkages?⁵ Could a public mapping/database of financial and economic variables apply to a company's unique risk profile? Can this mapping also reflect past observed correlations (including regime shifts) and include the ability to dynamically alter them?

8. Conclusion

We do not intend to create a “one and done” Risk Book, but rather build something like a dynamic Wikipedia summary of risk topics of current interest. We hope that this will spawn additional research into these topics, as well as relevant spin-off topics. Each chapter covers the central issues of its topic and includes references to additional information, where available. The IAA will update and maintain these chapters and their interrelationships on an ongoing basis on its website. The Risk Book is available to the worldwide actuarial profession and all those concerned with the sustainable governance (via identification, management and communication) of insurance operations.

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⁵ And, could it also be interactive and show different levels of resolution (e.g., like Google maps) and serve as a mass collaboration tool to communicate and sense and respond to emerging risks?

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