Quo Vadis Actuarius

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Introduction

1. The actuarial profession has been suffering to a greater or lesser degree from existential angst for at least two decades. My own decision to complete an MBA in the late 1970s was based on the feeling that we were increasingly out of touch with trends in the real world, that our training was deficient and that the profession’s future was problematic. In 2004 we are still around, syllabi are being updated, our numbers are much increased although still relatively small, we now have a genuinely effective international organization and an increasing proportion of our membership is taking the professional consulting route. However the angst remains. Why?

2. My view is that it derives from five key existential challenges:

   These are –

   (a) The World has become a much more uncertain place. This is partly because we are seeing much greater concentrations of exposure and vulnerability. However the potential for volatility is also greater and there appears to be a link between volatility and cooperative or catastrophic behavior. Hedge funds often rely on volatility to find their arbitrage opportunities, and human ingenuity has thus created a heady mix. This is a genuine case of challenge becoming opportunity, but the profession has already received some pretty nasty bruises from unexpected sources and needs to raise its game – in the future a lot of people are going to be depending on our members, world wide, sustaining their sense of professionalism and basic decency.

   (b) We have numerous vigorous competitors, some of which are also aiming at our core competence in dealing with uncertainty. The global risk management teams at a number of major financial conglomerates consists largely of mathematical physicists and applied mathematicians, not actuaries. The CFA syllabus to some extent parallels ours in terms of core skills, and there have been some tentative discussions in the US as to whether the actuarial profession should be co-opting this group. Public and financial economists have threatened to take over the retirement incomes debate – to the possible detriment of well rounded policy formulation and effective implementation. They have tended to take a more global approach to the issue and have thus been in a better position to influence the decision makers. Health economists are prominent in the health financing debate, which again needs practical financial and operating input from our profession.

   (c) The corporate governance and transparency push is placing increasing responsibility on boards and senior managements and leading to a slow but steady harmonization of capital and reporting standards world wide. This both raises opportunities for, and threatens the role of actuaries. On the other hand the Appointed Actuary concept was founded in the UK, and it is there that it is being abolished. In its stead we have a flock of actuaries with different names, all trying to
coordinate with each other and subject to nine new guidance notes and three background documents. In the meantime we are pushing for Appointed Actuaries or their equivalent in many client countries of the World Bank, supported by the 2003 IAIS Methodology.

(d) **Communications is becoming a key success factor.** Unfortunately we have not been as effective as we might in this area. While the UK’s Penrose Report was probably inevitable the Morris inquiry could possibly have been pre-empted by a more aggressive and politically attuned response.

(e) **The actuarial vocation is growing and spreading,** as is its client base. However as a number of papers have pointed out, there are two primary approaches to actuarial education and accreditation currently extant. These are the specialized education plus professional accreditation and reinforcement route followed largely by the English speaking world, and the academic plus regulatory oversight route followed by most Continental countries. The latter modality does not necessarily produce a fully professional corpus.

**Context**

3. In addition there are three background factors than need to be raised to provide some context. One is the particular relevance of consulting actuaries in the modern environment, another is the current role of the World Bank and its implications for consulting actuaries and the last is the potential for a nexus.

**Growth of Consulting Profession**

4. The consulting actuarial profession is growing. In a speech to the 2002 International Congress Paul Thornton, who has evidently thought more about our future than most, mentioned that the proportion of UK qualified actuaries in consulting has increased from 20% to 40% over the last 20 years. There are several causes for this growth:

(a) Not the least is the maturation and consolidation of the insurance sector at the same time as the number of qualified actuaries has rapidly grown.

(b) A second reason for the growth of the consulting arm has been the desire of many chief executives for a second opinion. Consulting actuaries also tend to be the more innovative and intellectually capable members of the profession. They see a lot more of what is going on than employed actuaries and are the natural place to turn to when one wants to challenge internal norms and get an objective view.

(c) Thirdly there are economies of scale. Actuaries are expensive and if an actuary’s costs can be shared their skills can be more widely used.

(d) Fourthly we saw a rapid growth in stand alone funded pensions arrangements, beginning in the 1960s. In most countries many of these
have been DB until recently and required periodic actuarial review by law. IAS 19 will add to the actuarial work load.

(e) Finally there appears to be a growing regulatory trend to seek a disinterested peer review. The Canadians started this trend and the British now appear to be heading in the same direction.

**World Bank**

5. In his article entitled “History of the Actuarial Profession” in John Wiley’s new Encyclopedia of Actuarial Science’ James Hickman evinces a hope that the IAA may have some influence on the activities of the IMF and the World Bank. I should perhaps report that the Contractual Savings and Insurance Practice in the Bank was initiated by Don McIsaac, a senior Canadian actuary, some 11 years ago and continues to be led by an actuary.

6. Our work is advisory and covers three main themes, namely:

(a) **Insurance and pensions regulation and supervision, risk management and sectoral efficiency.** This can include privatization and resolution work. Significant current efforts involve cleaning up TPL systems and improving solvency oversight in developing countries, often working with Consultant Trust Funds.

(b) **Risk management and funding of disasters**, including rapid onset and agricultural natural disasters, and terrorism risk.

(c) **Privatization of social insurance**, with a particular emphasis on retirement incomes.

7. **A fourth area, currently at the experimental stage is micro-insurance in particular and micro finance in general.** This comes under the Global Access to Finance initiative within the Financial Sector Vice Presidency. Consulting actuaries are already involved in this effort, working with such organizations as CGAP, but they are few and far between.

8. When explaining what we do I have had actuarial colleagues complain that we are competing with the consultants. This is not in fact the case – our role is to do the preparatory work for Bank operations – generally IBRD loans or IDA credits (effectively close to grants). This may involve on site research and development for the country prior to working up an operation: what we call Economic and Sector Work, or ESW. We will sometimes employ outside consultants during this stage. However the main point is that Bank staff cannot be funded out of loan funds – all this work has to be done by market suppliers and this is where most of the money flows. The key demand issue for you as consultants then becomes the flow of operations requiring actuarial input.

9. The IMF is also showing a growing interest in the insurance and pensions sectors. The Fund’s major brief is systemic risk and stability and they have begun to realize just how big the insurance and pensions sectors are, and the growing scope for links with the banking sector.
10. Both the Bank and IFC generate and see a lot of consulting actuarial output in the course of their work. IFC has an FIA on its own staff but sometimes asks World Bank staff to sit on the boards of insurance companies where it has an interest. In addition we are likely to become very involved in the development of the actuarial profession in many developing and even some transition countries. The financial assessment process in developing and transition countries almost inevitably generates a recommendation that an actuarial sector be built or strengthened.

11. As the banking sector work matures there is also an increasing interest in insurance markets and we are now seeing insurance sector indicators being built into adjustment loans, which have recently changed their name to development loans. The Bank is allocating substantial resources to basic policy work on annuities and risk management and we have taken on the role of explaining solvency developments to our 120 odd client countries. Finally we have a significant input into IAIS and sometimes into the Financial Stability Forum, including the latter’s concerns about the Reinsurance sector. The Bank and the Fund have recently been invited to become full non voting members of IAIS, which will give us access to the key committees.

12. Now its time to turn to the five issues.

Risk and Uncertainty

13. We are rapidly approaching the 200\textsuperscript{th} anniversary of our general acceptance as a profession, although the first designated actuary, William Mosdell of the Society for Equitable Assurances on Lives and Survivorships was appointed in 1762. It is perhaps fitting that in the latter part of the 20\textsuperscript{th} century it is the Equitable that has become the symbol for many of the challenges and opportunities facing the profession, including the role of the actuary in dealing with uncertainty under a modern governance and risk management regime.

14. The key role of the actuary has always been well defined – it is to help people make decisions today in the face of uncertain future cash flows. In this regard catch phrases such as ‘making financial sense of the future’ or ‘financial engineering’ are not particularly helpful. They could apply to any one of a range of contemporary financial sector professions and occupations. The key word is ‘uncertain’, which in this modern era needs to be differentiated from risk (although Frank Knight saw the distinction decades ago). Risk is something which can be modeled with a degree of confidence; it is business as usual. Uncertainty refers to the largely unknowable but distinctly possible adverse event and is made tangible through the concept of economic capital: the additional shadow capital an institution needs to cover fat tails (see Annex 1).

15. The actuarial profession should have a central role in economic capital determination, but right now we do not. It is the capacity to deal with uncertainty that has historically separated us from the rest. While actuaries can carry out a wide range of functions in the risk, or Gaussian, universe our skills are now potentially contestable. Here our competitive advantage arises from an in depth knowledge of a sector or technique rather than any fundamental or unique technology or basis for
professional judgment. It is outside the second standard deviation that we have the potential to show our true professionalism.

16. **We should be facing an era of great opportunity as uncertainty has become the key issue in finance.** It is unexpected events which have accounted for most of the numerous financial disasters which have stirred the body politic in recent years, led to changed legal and supervisory environments, questioned received wisdoms and threatened the status of not only our profession but even the foundations of modern financial economics. Basel II, tVAR, counter-party risk, internal controls, financial physics, credit risk transfer, global warming, urbanization, increased longevity and reduced fertility, structured instruments and the Tobin Tax are but a sample from the new language of uncertainty. The frustration is that the actuarial profession has had techniques in place to deal with uncertainty for many years. However we have been very slow to present the full capacity of our toolkit to the world and to update it in light of the developments in financial mathematics in the last two decades of the 20th century. In addition we have not helped ourselves by sometimes speaking sotto voce, if at all, when managements and boards have taken risks which appeared to be excessive, or appeared to act fraudulently.

17. The Society of Actuaries has formally recognized the emergence of risk management as a discipline and is considering giving it a central role in the education process. In its Summer 2003 Report on Education redesign the Society stated that "As the introduction of ERM into the design came relatively late in the design process, much more work remains to be done in order to define this track and its place in the education system. The Fellowship requirements in the interim includes a specialization called Finance/ Enterprise Risk Management. This is laudable and probably reflects the leading role US based institutions are taking in formalizing the global risk management role.

18. The following list shows the approach to the risk management process of one of the two major insurance based global institutions. It is representative of broader thinking in the major financial institutions:

   (a) Identify relevant risk factors
   (b) Measure risk exposures
   (c) Estimate joint probability distributions
   (d) Compute risk measures
   (e) Mitigate and manage risk

19. In practice the key risk objectives of a modern financial enterprise involve the following:

   (a) Balanced asset investment
      (i) Market risk
      (ii) Credit risk
      (iii) Liquidity risk
20. Each of these involves its own tool kit and all require an in depth knowledge of some specialized quantitative methods. One of the ideas behind the Basel II second pillar is to allow major sophisticated institutions to develop their own internal risk management models. The concern has already been expressed that the supervisors and rating agencies will not be capable of assessing these models. This has to represent an opportunity for our profession, and the consulting arm in particular.

21. Possibly the most immediately important risk related activity of the profession involves the capital requirements of insurers under the evolving EU Solvency II requirements. Most of the World Bank’s client countries follow the EU model. Solvency II is also intimately connected with the deliberations of the IASB on how to value insurance contractual liabilities. In this regard there has been a lot of rubbish put out by academic accountants who do not appear to appreciate that insurance liabilities are completely illiquid: it is reassuring that, in its new guise, IAA has managed to insert itself into the debate, and it needs to stay there. In my own travels in transition countries I have seen accounting bodies forcing market valuation of life office assets without any consideration of the liability valuation implications. In some cases the local actuaries have known enough to set up capital reserves to prevent premature distributions, but overall this area remains a source of professional exposure.

22. Even in the UK we saw an extraordinary high equity exposures in some insurers not so long ago. This was justified by papers extolling the virtues of actuarial smoothing until quite recently. However anyone with any knowledge of modern financial economics research or even a passing familiarity with North American RBC, would have appreciated that the capital levels required to support such a mismatched strategy were extraordinarily high. Hopefully most UK insurers are thinking more carefully about their economic capital allocations these days.

23. The World Bank has also been monitoring the scope for systemic risk to emerge from the insurance sector. This has two sources – links with the banking sector and a sudden loss of capacity of a class of insurance which is important to the real sector. An example of the latter is the HIH collapse and its perceived impact on the Australian construction and medical sectors. The former can emerge in a number of manners but of perhaps most current concern is the transfer of credit risk from the money center banks to yield seeking insurers in the US and Continental Europe. A number of surveys have been carried out to try to get a feel for this issue, with a 2003 Fitch study probably being the best known (see charts below).
24. The consulting actuarial profession, given its growing nexus with the accounting profession and the emerging imperative for boards to formally overview risk management, should be in a great position to generate a whole new line of business. However time is of the essence if we are to have a meaningful role in this activity. It will be a tragedy for the profession if we do not.

Global credit derivatives (bn US$)

![Graph showing the growth of global credit derivatives from 1990-96 to 2003.](image)

Sources: Swiss Re, BBA Survey, FSA (2002), Bank of England

25. The Annexes to this paper show the curricula for the CFA designation, the Chicago Masters in Mathematical Finance and the IAA 1998 Core Curriculum. In practice the leading actuarial programs have strong specialist streams in the latter stages as was anticipated by the framers of the Core Curriculum. The following table is based on more detailed versions of these curricula and provides a content comparison. The main conclusions that can be drawn is that despite the actuarial professions’ growing interest in the asset side of the balance sheet we are heavily outgunned here.

26. Both the CFA and Mathematical Finance courses include significant formal risk management components. On closer examination these are concerned largely with asset volatility (market and credit risk) and there is little reference to ALM. In the Core Curriculum there is a scant reference to ALM under the general rubric of “Principles of Actuarial Management” which is presumably the Control Cycle. This should probably be the subject of a substantial elaboration.
27. My own conclusion on the strategic implications of competition is a little different to the ‘Big Tent’ model that has been considered for the USA profession: it is that we should concentrate on the mathematical finance and financial economist post graduates rather than the broader universe of financial sector vocations. While at least one famous actuary is alleged to have said that ‘we are all actuaries now’ I am not convinced that I would want some of the people we work with to form that view. The CFAs for example do not appear to be particularly interested in the liability side of the balance sheet and have their own concept of professionalism. However any actuary who wants to work in funds management should seriously consider picking up the designation while his or her mind is still in examination mode.

28. The graduates of the advanced mathematical programs on the other hand are more than capable of assimilating actuarial techniques and way of thinking in a hurry, and the typical candidate will be a tabula rasa in terms of professional indoctrination. The US profession in particular could profitably consider some way of fast tracking the best of them into the profession, and then asking them to set up a Risk Management specialist stream. In some countries the process has begun with the actuarial and mathematics of finance schools being combined. A good example is Waterloo in Canada. The best Mathematics of Finance schools such as Chicago and Carnegie Mellon have identifies themselves already and the challenge becomes one of linking them into the actuarial stream.

**Table 1: Curriculum Comparisons**

<table>
<thead>
<tr>
<th>Subject/theme</th>
<th>CFA</th>
<th>Chicago</th>
<th>IAA CC</th>
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</thead>
<tbody>
<tr>
<td>Professionalism</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Micro/ macro Economics</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Accounting/ statement analysis</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Corporate Finance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital markets</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Quantitative Investment Management and valuation</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Portfolio Management and Asset Allocation</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Asset Performance Measurement and Attribution</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Maths Stats and Probability – traditional inference and time series</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mathematical Methods in Finance (Stochastic calculus etc)</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Financial Economics</td>
<td>x</td>
<td>X</td>
<td>x</td>
</tr>
<tr>
<td>Modeling</td>
<td>x</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Actuarial Risk Theory</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Actuarial techniques (pricing, reserving etc)</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Control Cycle including ALM</td>
<td></td>
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<td>X</td>
</tr>
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</table>
29. Our other apparent competitors are the pensions and health economists. We as a profession have rather dropped the ball in both these areas and have allowed economists to drive the global agenda. However in practice the economists are not competitors. They are more like co drivers and are better trained to deal with the short to medium term fiscal, foreign exchange and political economy issues arising from pensions reform.

30. On the other hand many economists do not have a good feel for the micro implications of introducing major systemic reforms. They tend to assume that the market will provide what is needed to effect the policy reforms and that adequate governance levels will spontaneously come into being. They also tend to lose sight of the capital implications of guarantees, smoothing mechanisms, annuity provision and embedded options let alone the risk management issues arising from asset and fund manager choice, or whether a trustworthy custodian is available.

31. Actuaries and pensions economists certainly need to start working together on the longer term issues. In his Presidential speech to the Faculty and Institute a few weeks ago Michael Pomery states that that one of the simple emerging truths which we should be promoting is that ‘...there are only two ways to avoid a lower income in retirement: to save more; or to retire later’. While this is no doubt literally true a deeper question emerges if one reframes the statement in terms of consumption. At the end of the day there are so many productive workers and so many relying on their output, and accumulated financial assets may simply determine one’s consumption relative to other retirees rather than its absolute level. There has to be a good possibility that the baby boom generation in the large relatively closed economies will be retiring quite a bit later, period.

32. A related issue is the conversion of DC lump sums into income streams. Some members of our team, including an actuary and a couple of very capable economists, are spending close to US$250,000 a year of policy budget examining annuity markets around the world. Key objectives are to determine if such markets are sound and what sorts of capital levels are necessary to write this business without government support. We have worked with some UK consulting actuaries in preparing the background material for this work, and will probably work with some Latin American consulting actuaries in the next phase.

33. Health economists, also appear to have a tendency to assume health insurance markets into existence. Some health economists have particular problems with the dynamic pricing, incentive systems and actuarial versus community rating issues that health insurance actuaries live with day to day. However, one thing that is clear to most practitioners in the health field is that most World Bank client countries will be relying largely on private funding and delivery mechanisms for the foreseeable future. This has to be a major growth area for health insurance specialists. India and China, which between them account for a good part of the developing world, are actively developing their health insurance industries and a number of international actuarial consultants are already working in these markets.
34. Natural disasters and agricultural risk are also areas where we have not realized our potential and left much of the high level policy to others. The development of the catastrophe bond market has largely devolved to financial economists and investment bankers and recent developments in weather and index agricultural risk have not heavily engaged our profession. These are all areas where we could have been setting the agenda. One area where we have claimed expertise but where we would do better to leave it to others is the modeling of rapid onset natural disasters losses. This generally requires specialized knowledge of the underlying physical processes as well as long tail modeling.

**Governance and Transparency**

35. There is a huge ongoing international effort to force good governance, including risk management, into the board room. This includes the current ferment about financial reporting standards. Actuaries have inevitably become embroiled in this.

36. The most obvious manifestations affecting actuaries are the whistle blowing and actuarial reporting requirements creeping into insurance law in a number of countries, the increasing concern with professional conduct in the leading actuarial bodies, the move in some jurisdictions towards independent peer review, and certification requirements for the specialized streams. The first and last of these assumes that the actuary is competent and independent. The second and third raise doubts, although it can be safely stated that actuaries tend to do the right thing in most business as usual situations.

37. **It is when actuaries get into extreme and unusual situations that they are vulnerable.** Examples of bending under pressure I have seen include quoting a virtually closed pension fund on a new entrant basis to get the business, twisting the Academy’s standard on determining life insurance appraisal values almost beyond recognition to satisfy a powerful chairman in a large transition country, and cooperating in the egregious smoothing of non life profit emergence. Peer review and professional sanctions would both appear to be appropriate mechanisms in these situations. In this regard actuaries should be subject to sanctions by their parent body regardless of where they are doing their work (as is already the case with our US colleagues).

38. **In some ways the more worrying situation is when actuaries are dealing with situations on the margins of any meaningful specification.** This may involve principles with questionable business objectives and ethics who provide incorrect data, political economy issues or a process which is poorly understood. The only recourse here is leaving clear evidence of the professionalism employed during the work program, and ensuring that the uncertainties in the results produced are properly documented. Consultants may also have to face up to declining the work, or resigning mid commission. Non life long tail insurance and related risks probably comprise the classic at risk situation and it is here that the profession has its strongest obligation to provide clear guidance.

39. **Certainly if we are going to be subject to public ex post peer review in such uncertain situations then an in house ex ante process may be preferable.** The question is just how far this all should be taken. The FSA has created up to four
new actuarial roles under their post Appointed Actuary regime. These are the actuarial function, the with profits actuary, and their two peer review functions. The reviewers are required to be external to the firm involved and any group to which it belongs. When one considers that the actuarial function and the with profits actuary may be one and the same person or that one may report to the other, or than one may be on the board but not the other, plenty of scenarios present themselves. The Faculty and Institute’s GN 39, one of nine dealing with this new area of practice (see table), tries to untangle the situation and it makes a diverting, not to mention risible, half hour’s reading. To complicate this the auditor is required to take independent actuarial advice when preparing his or her certificate. All of this to force accountability onto the Board and to avoid perceived conflicts.

GN 39 General responsibilities and relationships
GN 40 The actuarial function holder
GN 41 The with profits actuary
GN 42 The reviewing actuary
GN 43 The appropriate actuary
GN 44 Mathematical reserves and resilience
GN 45 With profits capital component
GN 46 Individual capital
GN 47 Stochastic modeling for life insurance reserving and capital

40. Readers will not be surprised to hear that the World Bank will not be recommending the UK approach to client countries. Not only would it be impossible in practice given available resources, but some of the premises behind the model are questionable and probably reflect a peculiar path dependency. Historically the problem in the with profits sector has been excessive surplus distribution, not the opposite. For a good case study I would recommend a review of Redington’s 1981 paper, The Actuarial Climates of the 20\textsuperscript{th} Century (JIA 108). The separation of the valuation and with profits actuarial functions is artificial – they are two sides of the same coin. On the other hand there has long been a need to force directors and auditors to accept their responsibilities with regard to contractual liability determination. There is also evidence that that employed specialists can be influenced, particularly in competitive situations (see Redington) or where stock options are involved (Enron etc). Thus the external peer review seems like a good idea and now seems likely to be established in a number of important insurance markets. The issue then is how to ensure that the external reviewer does a disinterested and professional job. This is where strong sanctions and the threat of public exposure can help. Such a structure would also reduce the opportunity for governments or bureaucracies to introduce excessive law based control of our profession.
41. This leads into the topic of the international insurance contracts valuation standard. IFRS 4 makes it clear that the ultimate standard will be oriented to financial reporting rather than prudential concerns. The people initially designing the new standard appeared to be in thrall to the concept of efficient markets and the idea that the fair value of an insurance contractual liability is a meaningful concept in the complete absence of a transparent and liquid market. Fortunately minds more attuned to the real world have intervened and a proper debate, which hopefully will acknowledge that there is some relationship between the two sides of the balance sheet, is now under way.

42. The question then becomes one of how much economic capital to set aside to ensure that there is an acceptable probability that people will be paid out according to their reasonable expectations. The regulators and supervisors will have some say in this but no doubt we will see arguments, as there have already been in the banking world, that sophisticated organizations with strong risk management capabilities, should be allowed to use their capital more efficiently than the blunt regulatory capital rules allow. You as independent actuaries have a special responsibility here as in my view many directors will be in thrall to the shareholder ownership concept and will want to maximize reported profitability. Again we need to ensure that our profession has a central role in the debate, and the consultants in particular will need to weigh in as relatively disinterested commentators.

Communications

43. Actuaries are not known for their communications skills. This is of course a generalization as many consulting actuaries have to explain complex ideas to clients regularly, and succeed in this. In addition a small proportion of our number get into senior management and have to learn at least the rudiments for pure survival purposes. Given that we do in fact have a rich communications vein to mine why are we evidently losing the communications battle? One obvious reason is that we are a very small profession and have low visibility. Another is that we are generally distant from the general public – they only hear about us when something goes wrong, as it increasingly has.

44. There are five communications strategies open to us in this situation. The first is to become much larger, work in a lot of areas and become more visible, effectively diluting the impact of bad news and generating a positive general awareness. This would in practice mean following the North American Big Tent concept: co-opt all those doing similar work and give them their own specialization within a much broader profession. This would raise some complex professionalism issues and, as indicated earlier, is in my view is problematic.

45. The second strategy is to set up high level formal promotion and communications capacities in each of the major professional bodies. This may have some merits however we would need to study the other professions carefully to learn how they do it. The restructured IAA is a potential strong weapon in our armory and the decision of IACA to link up with the umbrella body should add enormously to our communications capacity given the size and professionalism of its membership.
46. The third strategy is to ensure that our members develop good communications skill. This is now recognized in some programs, most notable in the Faculty and Institute curriculum.

47. The fourth strategy is to increase our legitimacy by setting up legally recognized independent boards to vet our standards. The three boards of which I am aware, the US Board, the Australian Life Board and the IAAs Sub Committee have different approaches but all aspire to the appearance of a degree of independence. The Australian Board has one non-actuarial member and the IAA involves a large number of “Interested Persons” including numerous members of IASB. The British also appear to also be heading towards an Actuarial Standards Board structure.

48. The final and fifth strategy is to be seen to be taking firm action when a member does not live up to required levels of professionalism. The various actuarial bodies have been very different in their approaches. There are always good reasons for fixing things up behind the scenes including legal liability concerns, not preempting other processes and a natural reticence when it comes to disciplining a colleague. Unfortunately in this day and age I don’t think we can get away with this approach.

Education versus professionalism

49. In the last few decades we have seen the introduction of experience requirements, professionalism courses and specialized certification. These are all desirable moves but do not a profession make. What they have done is helped to differentiate between the concepts of professionalism and education. The new education strategies being introduced in the UK and North America explicitly recognize this dichotomy.

50. In her chapter in the Control Cycle text Clare Bellis discusses the concept of professionalism in some detail. Prerequisites include a formal entity to establish standards and enforce discipline, and a recognized body of knowledge. In his Actuarial Encyclopedia chapter Hickman refers to the alternative Continental model involving university education and centralized regulation and there is evidence that even those working within this system would like to see a greater degree of professionalism. The US model is seen by some to take elements from both the British and the Continental model however the existence and role of the Academy points to a professional approach.

51. In an article in Contingencies in 2000 Howard Bolnick introduced a definition of actuary which sets a market test – a formal recognition of mutual trust between the professional group and the larger public. Given recent turbulence in pensions and insurance markets in particular there is no doubt that the thinking public is beginning to recognize that we exist, but not necessarily in a positive way. We will need to accept that a bifurcation is occurring in the actuarial world between those who have simply passed the exams and those who have developed the depth of knowledge and credibility in their chosen specialty to be called real professionals. Consulting actuaries are professionals by definition and must drive the agenda under this heading, as they must under the other four headings. The question is just how much IAA can enforce the incremental professionalism layer on non complying or aspiring members. IAA’s web site lists ‘promoting high standards of professionalism to ensure that the
public interest is served’ as one of its objectives. This is a tall order and one would hope that IACA will take on the role of gatekeeper for this matter.

52. Aside from our own internal standards we will experience increasing market pressures to sustain professionalism in our work. Litigation and the deep pockets syndrome is becoming a global issue and PI insurance is being required of the professions in the most unlikely countries. The more precise our standards are the more we expose those who we permit to give what are effectively legally binding opinions.

53. Finally there is the issue of trade in services or GATS. The accountants have come up with a document which is more good intention than substance and discussions have begun with our profession, through IAA’s Professionalism Committee. However it seems that it will be many years before a multilateral approach will be possible. In the meantime the various bilateral arrangements are a start. This may be a mixed blessing. An Indian Cardiologist that your President and I know has a chain of tertiary level private hospitals and is already undercutting American hospitals for cardiac surgery by more than 50%, and producing very high success rates. I would have thought that on line actuarial services would be easier to organize: there are approximately 3,000 actuarial students in India and the Society in that country will be seeking bilateral recognition with industrial countries.

Emerging Markets

54. If you examine the committees of IAA and IAIS you will find that they have a distinct G7 plus Australia hue. When the IAA visits the World Bank I am particularly conscious of this, as Caucasians tend to be in the minority within our organization. IAA and IACA need to introduce diversity programs as soon as possible.

55. In addition many consulting actuaries, particularly those in the main firms have little idea how basic the needs are in many of our countries. Consultants have a responsibility to point out that a TOR has been over-specified if they find themselves in a situation where their input is going to fly way above the heads of the putative recipients. In this regard USAID, which is pouring huge amounts into insurance and pensions work in developing markets is now thinking of introducing a relevancy check before asking for RFPs. Another major source of insurance consulting fees is FIRST, who’s management have established a consultants panel. Under FIRST’s approach no insurance or pensions related projects are approved without a thorough vetting by both FIRST committees and the World Bank’s advisory and liaison teams. In addition working in developing countries is an art in itself, involving diplomacy and patience, but knowing when to hold the line.

56. Another emerging market issue is the development of local actuarial skills. It is becoming clear that traditional actuarial skills will undergo a resurgence as developing countries employ product and institutional structures which have became standard (and in some cases obsolete) in the advanced industrial countries. For example the rapid emergence of microinsurance will require the skills of Friendly Society actuaries. We also see varieties of whole of life and endowment product structures appearing in many jurisdictions and Third Party Liability insurance is now compulsory in virtually every country.
57. Local actuarial bodies will undoubtedly appear in most developing markets. The development of the actuarial profession in Latin America and Eastern Europe seems to be particularly important as the life sector in most of these countries is anything but stagnant – rather it is in transition and growing. While technical data is plentiful, the technical analysis of it is typically very limited and the number of actuaries is miniscule compared to the sector size. Thus there will be an ongoing need for consulting actuaries who are prepared to work in such environments. Most of these countries offer their own particular challenges, some of which will come as a shock to actuaries used to working in relatively well ordered societies. FIRST and the World Bank have identified actuarial development in emerging markets as a priority issue and IAA is of course also interested from an accreditation point of view.

58. Rather than dealing with countries with no actuarial history on a piecemeal basis my hope is that we can develop a standard para actuarial training program and that a special category can be created by IAA to accommodate this. Such a step may be sufficient to prevent countries from setting up barriers to entry to non-resident actuaries, who are usually far more qualified and experienced than the local variety. As it is, many developing countries require membership of the local actuarial body before signing authority under the law can be granted. Often these local organizations are run by the professors at the universities providing the actuarial training. These professors in turn sometimes have little real knowledge of core actuarial concepts.

59. The best candidate for such a course may be a program being developed in Macedonia with largely British input. This is designed with both basic and advanced levels and is run, in the Continental European way through the local technical university. There is a great potential role for recently retired consulting actuaries to play in those countries which have produced an acceptable education program but have yet to add the patina of professionalism.

Conclusion

60. Thus as we enter the 21st century the profession, and IACA in particular, needs to support four agendas – 1) reinforcing our sense of the basic actuarial mindset, while separating those who have both professional and legal responsibilities from those who do not, 2) continually upgrading our toolkits to deal with a more dangerous, volatile and interlinked world, 3) strongly communicating our capacities to those who need our skills, including becoming actively engaged in the big pension, health funding and risk management agendas, and 4) building the profession through co-opting those in industrial countries who can be brought into the actuarial way of doing things, and control and support the education process in emerging markets. The consulting actuaries will be increasingly required to carry the professionalism flag, as it is becoming clear that employed actuaries are decreasingly able to exert the influence that they once did. The reward will be a growing opportunity set.
Annex 1

Expected and Unexpected Loss

- **Expected Loss** depends on
  - Exposures
  - Claim frequencies
  - Severities
  - Recovery rates

- **Unexpected Loss** is a function of
  - Components of Expected Loss
  - Concentrations/correlations
  - Reinsurance Credit Risk
  - Investment Risk (ALM)
  - Systemic changes

![Diagram of Loss Rate over Time](image)

- Average Expected Loss (EL)
- Standard deviation: Unexpected Loss (UL)

![Diagram of Loss Rate Probability](image)

- 99.9% Confidence
- Risk-Based Economic Capital $K \times UL$
- Fat tail
# Annex 2

## Chicago Masters in Mathematical Finance

### Course Overview

<table>
<thead>
<tr>
<th>MATHEMATICS</th>
<th>PROBABILITY THEORY &amp; ECONOMICS</th>
<th>FINANCIAL APPLICATIONS &amp; SIMULATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST QUARTER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial Differential Equations</td>
<td>Stochastic Calculus 1</td>
<td>Portfolio Theory and Risk Management I</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed Income Derivatives I</td>
</tr>
<tr>
<td><strong>SECOND QUARTER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Numerical Methods for PDEs</td>
<td>Stochastic Calculus 2</td>
<td>Fixed Income Derivatives II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foreign Exchange</td>
</tr>
<tr>
<td><strong>THIRD QUARTER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimization</td>
<td>Topics in Economics</td>
<td>Advanced Option Pricing</td>
</tr>
<tr>
<td>Neural Networks</td>
<td></td>
<td>Portfolio Theory and Risk Management II</td>
</tr>
</tbody>
</table>
**Annex 3**

**FCA Curriculum**

**Level I** curriculum and examination focus on tools and concepts that apply to investment valuation and portfolio management. Level I also includes an overview of the processes of asset valuation and portfolio management. Candidates are expected to display a working knowledge of:

- financial statement analysis,
- macro- and micro-economics,
- quantitative methods of investment analysis and management,
- financial markets and instruments, and
- corporate finance.

**The Level II** curriculum and examination focus on asset valuation. Candidates must apply the tools and concepts emphasized at Level I in analyzing and valuing investments, and should have a thorough understanding of industry and company analysis. Candidates must demonstrate the ability to:

- analyze specific equity and fixed-income securities and other investments,
- estimate expected investment return and risk,
- compare alternative investment choices and make investment recommendations, and
- apply the CFA Institute *Code of Ethics* and *Standards of Professional Conduct* in practical situations.

**The Level III** curriculum and examination explore in greater depth the discipline of portfolio management. Candidates must demonstrate a working knowledge of the entire portfolio management process and must be capable of applying the concepts learned at Levels I and II to the portfolio management process. Candidates also must demonstrate a thorough understanding of:

- performance presentation standards and measurement techniques, and
- the CFA Institute *Code of Ethics* and *Standards of Professional Conduct* from an organizational and compliance perspective.
Annex 4

IAA Core Curriculum

Education Syllabus

1. FINANCIAL MATHEMATICS

Aim:
To provide a grounding in the techniques of financial mathematics and their applications.

Topics:
- Introduction to asset types and securities markets
- Interest, yield and other financial calculations
- Investment risk, introduction to stochastic interest and discount
- Market models - e.g. term structure of interest rates and cash flow models

Indicative Reading:
Core Reading (Subject A1 - Subject 102)
Faculty and Institute of Actuaries
Mathematics of Finance
J J McCutcheon and W F Scott

2. PROBABILITY AND MATHEMATICAL STATISTICS

Aim:
To provide a grounding in probability and mathematical statistics.

Topics:
- Concepts of probability
- Random variables and their characteristics
- Methods and properties of estimation
- Correlation and regression analysis
- Hypothesis testing and confidence intervals
- Data analysis

Indicative Reading:
Mathematical Statistics
Subject C1 Core Reading/Subject 101 Core Reading
Faculty and Institute of Actuaries

3. ECONOMICS

Aim:
To provide a grounding in the fundamental concepts of both micro and macroeconomics.

Topics:
- Microeconomics
- Macroeconomics

Indicative Reading:
There are many suitable textbooks at an introductory undergraduate level although most will have a fairly strong national bias.

Economics
Begg, Fischer and Dornbusch, published by McGraw-Hill, would be suitable for the UK.

4. ACCOUNTING
Aim:
To provide the ability to interpret the accounts and financial statement of companies.

Topics:
- Basic principles of accounting - including the role of accounting standards
- Different types of business entity
- Basic structure of company accounts
- Interpretation and limitation of company accounts

Indicative Reading:
Accounting texts tend to be too detailed and country specific, although the very introductory parts of standard accounting courses may be suitable. Other suitable texts are likely to be written for general management studies rather than for accountants. On the analysis of accounts, most books written for investment analysts are likely to contain too much industry and country detail. A treatment at a suitable level is provided, for example, in the chapter "Analysing Financial Performance" in Principles of Corporate Finance, by Brealey and Myers, published by McGraw-Hill.

Other suitable texts might be the training manual for the Investment Management Certificate of the Institute for Investment Management and Research (IIMR) and the Core Reading for Subject 108, Faculty and Institute of Actuaries.

5. MODELLING
Aim:
To provide an understanding of the principles of modeling and its applications.

Topics:
- Model structures
- Selection process
- Calibration
- Validation
- Scenario setting
- Sensitivity testing
- Limitations

Indicative Reading:
Core Reading (Subject 103)
Faculty and Institute of Actuaries
Introduction to Actuarial Modeling
James C Hickman North American Actuarial Journal (1:3)
Current Actuarial Modeling Practice and Related Issues and Questions
Angus S Macdonald North American Actuarial Journal (1:3)

6. STATISTICAL METHODS
Aims:
To provide the skills and expertise in the use of models appropriate for the understanding of risk in a range of actuarial work.

Topics:
- Statistical models, such as regression and time series
- Survival and multi-state models
- Risk models (individual and collective)
- Parametric and non parametric analysis of data
- Graduation principles and techniques
- Estimation of frequency, severity and survival distributions
- Credibility theory
- Ruin theory

Indicative Reading:
Actuarial Mathematics
Bowers et al
Casualty Actuarial Society textbooks for their examinations 3 and 4
Subject C2 Core Reading/Subject 104 and 106 Core Reading
Faculty and Institute of Actuaries

7. ACTUARIAL MATHEMATICS

Aim:
To provide the skills and expertise in the mathematics that are of particular relevance to actuaries working in life insurance, pensions, health care and general insurance.

Topics:
- Actuarial mathematics as applied to life insurance, pensions, health care and general insurance
- Types of products and plans - individual, group and social insurance arrangements
- Pricing or financing methods of products and plans
- Reserving
- Reinsurance

Indicative Reading:
Life Insurance Mathematics
Gerber
Actuarial Mathematics (Part A)
Bowers et al
Core Reading for Subjects 104 and 105
Faculty and Institute of Actuaries
Casualty Actuarial Society textbooks for their examinations 5 and 6
Actuarial Practice of General Insurance
Hart, Buchanan and Howe, Institute of Actuaries of Australia
Subject G Core Reading - Subject 303, 403 Core Reading
Faculty and Institute of Actuaries.

8. INVESTMENT AND ASSET MANAGEMENT

Aim:
To develop the ability to apply actuarial principles to the valuation, appraisal, selection and
management of investments.

**Topics:**
- The objectives of institutional and individual investors
- Types of investment (bonds, shares, property and derivatives)
- Regulation and taxation of investments
- Valuation of investments
- Portfolio selection - incorporating assessment of relative value
- Performance measurement
- Portfolio management

**Indicative Reading:**
Most investment textbooks are either too theoretical or too practical, not mathematical enough and country specific. There are however several US textbooks which contain some material which would be appropriate. These include:

**Investments**
Sharpe, W F (1978) published by Prentice Hall, New Jersey

**Modern Portfolio Theory and Investment Analysis (5th edition)**

Parts of the textbook currently being prepared by the Society of Actuaries

**Options, Futures and Other Derivatives (3rd edition)**
Hull, J C (1997) published by Prentice Hall International

The relevant parts of Core Reading for Subjects 1 - 2, 109 and 301
Faculty and Institute of Actuaries

9. **PRINCIPLES OF ACTUARIAL MANAGEMENT**

**Aim:**
To develop the ability to apply the principles of actuarial planning and control needed for the operation of risk related programs on sound financial lines.

**Topics:**
- The general operating environment
- Assessment of risks
- Product design and development
- Pricing and assumptions
- Reserving and valuation of liabilities
- Asset and liability relationships
- Monitoring the experience
- Solvency of the provider
- Calculation and distribution of profit (surplus)

**Indicative Reading:**
Core reading Subjects 302, 303, 304 - F, G, H
Faculty and Institute of Actuaries

Actuarial Control Cycle
Institute of Actuaries of Australia
10. PROFESSIONALISM

Aim:
To develop awareness of professionalism issues and the importance of professionalism in the work of an actuary.

Topics:

- Characteristics and standards of a profession
- Code of conduct and practice standards
- The regulatory roles of actuaries
- The professional role of the actuary

Indicative Reading:

Professionalism Course: Participants Course Notes
Faculty and Institute of Actuaries

Professional Ethics Course: Handouts
Society of Actuaries

Code of Conduct - relevant actuarial body