

# Malaysian Actuary

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## CONTENTS

### 1 Message from President

#### News

### 2 2006 Executive Committee

### 3 News from the Singapore Actuarial Society

### 3 Updates from University Malaysia

#### Events

### 4 Itinerary of events for the year

### 4 Mount Kinabalu expedition

#### Interview

### 6 Interview with Mr. Lee Jiau Jiunn

#### Feature articles

### 8 Unwanted publicity?

### 9 No title yet...

### 10 Introducing Bayesian Networks for Modelling of Operational Risk

### 16 Sudoku

#### Students

### 17 Education newsletter

### 19 Australian education path

### 22 Puzzles

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Ravinder Singh

I wish to thank all members for reelecting me as the President of the Actuarial Society of Malaysia (ASM). I am even gladder to see that the new Executive Committee (EXCO) members consist of many new faces. This augurs well for the future of ASM because the future of ASM will depend on new blood.



The new committee has begun to plan for the new year, and hopefully we will see some events in the coming months. Each Chairman of the sub-committees will need your assistance to help to plan the activities. I would urge members to actively participate in it. I wish to inform you that the secretary elect, Mr. Lee Kin Hoe, had since resigned from the EXCO due to his new job in Singapore. He has served diligently and ASM would like to record his contribution to the Society.

The year 2006 began with the release of the second draft of the Risk Based Capital framework to the insurance industry by Bank Negara Malaysia. Surely this will keep the actuarial profession busy for the next few months. Indeed the first submission was due April 30 2006 and the second one due June 30 2006. It will be very interesting to see how this new proposed framework affects all insurance companies, in particular whether more changes will be needed after the Bank assessed the submission. All I can foresee is that the latest development will keep the actuarial profession busy.

The other new development that will keep the actuarial profession on its toes is the implementation of the Financial Reporting Standard (FRS) 139. There is no doubt that the actuarial and accounting personnel will have to put their heads down in the coming months to ensure they comply with the new accounting standard.

It does look like that the year 2006 will be pre-occupied with financial reporting issues. This is not surprising given that other countries have already adopted the IFRS 4. In fact, I know that many of our counterparts overseas are definitely adapting to the change and coping with the additional requirements. ASM, in conjunction with the Society of Actuaries has organized a regional seminar on current topics in financial reporting to bring together experts to discuss the most current developments in financial reporting, enterprise risk management as well as experiences from countries adopting IFRS..

Bank Negara Malaysia had also announced the four recipients of the Takaful license earlier this year. These new and existing licensees will definitely make a strong inroad into the traditional insurance market. There is a strong possibility for ASM to influence the actuarial issues within the Takaful industry. As a professional body, ASM will need to consider how we could add value to it. Yet again, ASM needs someone with Takaful knowledge to champion the cause.

2006 is the year of World Cup, which is currently hosted in Germany. Soccer fans will not want to miss the once-in-four-year chance to watch this great football tournament. For those of you who are prepared to stay awake at night, please take good care of yourselves.



## Executive Committee 2006

The 2006 Actuarial Society of Malaysia's Annual General Meeting (AGM) was held at the Legend Hotel on the 26th of January 2006. The Society elected its new Executive Committee with JJ Lee being retained as the President.

Before the AGM commenced, the ASM members were treated to two thought-provoking presentations. Both the Morris Review and IFRS4 talks provided new insights to the members, and helped us understand how it will eventually affect the actuarial community in Malaysia.

After the two presentations, the AGM proper was held, where the Society elected the new Executive Committee of 2006. Dinner then followed, with many taking the opportunity to catch-up with old friends and to make new acquaintances before calling it a night.

We congratulate the newly elected ASM EXCO of 2006!

### President

**Lee Jiau Jiunn**

American International Assurance

### Vice President

**Anusha Thavarajah**

ING Insurance Berhad

### Immediate Past President

**Teh Loo Hai**

Teh Actuarial Services

### Secretary

**Lee Kin Hoe\***

Bank Negara Malaysia

### Treasurer

**Ong Kheng Heng**

Prudential Assurance Malaysia Berhad

### Committee Members

**Ravinder Singh**

Hannover Re Malaysian Branch

**Gary Hoo**

NMG Financial Services Consulting

**Liew Pek Hin**

Malaysian Life Reinsurance Group Berhad

**Johannes Nothling**

Hannover Re Malaysian Branch

\* Assumed by Lim Chee Beng from ING Insurance Berhad from May 2006



President of ASM, JJ Lee presenting on the Morris Review



Immediate Past President, Teh Loo Hai giving an overview on IFRS 4



2006's ASM Executive Committee. From left: Gary, Kheng Heng, Ravinder, Kin Hoe, Loo Hai, JJ, Anusha, Johannes and Pek Hin

## News from the Singapore Actuarial Society

by Chi Cheng Hock

### 30th Anniversary

The Society held its 30th annual general meeting on 17 Mar 2006. Andrew Linfoot, Mark Birch and Tim Beards all were returned as President, Honorary Secretary and Honorary Treasurer, respectively. Khoo Kah Siang was elected Vice-president.

As 2006 is the 30th anniversary year of the Society, the Founding Members were invited to the annual dinner that followed. 4 of the 16 Founding Members managed to grace the occasion with their presence. Further events will be held to commemorate this milestone of the Society.

On the same day, an extraordinary general meeting was called to vote on a number of constitutional changes. The key amendments were: -

- ◆ to allow the Council to admit as Fellows of the Society, actuaries who are not Fellows of the currently recognized actuarial associations [the Institute and Faculty (UK), the Society and Casualty Society (North America), the Institute of Australia and the Canadian Institute] subject to meeting

certain criteria. This will allow more actuaries working in Singapore to participate in the development of the profession.

- ◆ to allow up to two Associates to sit on the Council. This will encourage the younger members of the profession to take an interest in actuarial matters in Singapore.

### Past Year

Over the preceding Society year, 2005/06, membership grew by 21 to 235, of whom 95 were Fellows.

The Society office bearers met with officers of the Monetary Authority of Singapore in Jun 2005 to discuss how the Society can be more active in actuarial issues affecting the insurance industry. Since Jan 2005, any actuary taking up a life insurance fund appointed actuary position in Singapore must attend an induction course conducted by the Society.

In July 2005, the Society successfully organized a leg of the Joint Regional Seminar on Asset-liability Management. Attendance exceeded expectations at 150, drawn from around the region. Besides this major conference, the Society also organized actuarial forums for the members' continuing professional development.

### Looking Ahead

Looking forward, the major event will be the conference on retirement issues to be held in Oct 2006. The Society hopes to draw speakers from illustrious bodies like the World Bank and the International Actuarial



Association. This major meeting will be one of the 30th anniversary highlights.

The Society is also organizing an Institute (UK) CA2 Modeling Module Workshop in Aug 2006. Students from Malaysia have registered for this workshop.

In the pipeline are new guidance notes for members involved in liability computations under the risk based capital framework, and for the continuing professional development requirements for members. These will supplement the existing guidance notes for life fund appointed actuaries, and for actuaries investigating the liabilities of general insurance funds.

## Updates from University Malaya

by Dr. Pooi A.H.

*Institute of Mathematical Sciences, University of Malaya*

The first batch of students in the B.Sc. (Actuarial and Financial Mathematics) programme offered by the Institute of Mathematical Sciences (ISM), University of Malaya will reach their third year of studies in the 2006/2007 academic session which begins in July 2006.

They are required to undergo industrial training in actuarial science during the period Feb

2007 - June 2007. By Feb 2007, these students should have acquired knowledge in Theory of Interest, Life Contingency (Parts 1 and 2), Investment and Financial Analysis (Part 1) and General Insurance (Part 1).

Companies that are interested in recruiting them for industrial training may contact ISM using the e-mail address [ahpooi@um.ed.my](mailto:ahpooi@um.ed.my).

## Itinerary of events for the year

by Events Sub-Committee

We've had a quiet start to 2006 but we've not forgotten our responsibilities! So here's what we've got lined up for the rest of the year:

**ASM Evenings** : July 13, September 14  
Contact person : [Kwek.ChengSeng@ing.com.my](mailto:Kwek.ChengSeng@ing.com.my)

**Lunch Talks** : October, December  
Contact person : [Elisya.Foo@hannover-re.com](mailto:Elisya.Foo@hannover-re.com)

**Presentation & Annual Dinner** : Early August  
Contact person : [Diana.Foong@prudential.com.my](mailto:Diana.Foong@prudential.com.my)

**Paint-Ball & Go-Karting** : November  
Contact person : [Pong.ChiewPing@lifeisgreat.com.my](mailto:Pong.ChiewPing@lifeisgreat.com.my)

**Expedition to Mount Kinabalu** : Mid February 2007  
Contact person : [Chang-Yueh.Loke@hannover-re.com](mailto:Chang-Yueh.Loke@hannover-re.com)

The flurry of events will be kicked-off by an "ASM Evening". The ASM Evening will basically be an evening after work, where actuaries and students alike can meet and mingle. It will hopefully give us a chance to get to know who's who in the industry, and catch up on the latest news and gossip in the industry! But on a more serious note, we hope that this event will also provide an avenue for the ASM EXCO to meet with members, and discuss issues pertaining to the interest of the society.

The first ASM Evening will be held at Carnegie's on Jalan Sultan Ismail on the 13th of July. Everyone is invited to drop by after work, relax and unwind. A minimal fee of RM10 per person will be charged for buffet finger food and an unlimited supply of soft drinks. The ASM has kindly agreed to subsidize a portion of the cost of the event.

As each event draws near, detailed notices will be sent out to all members to let you all know the logistics of the event. If you have any queries, do feel free to drop me an e-mail at [Elisya.Foo@hannover-re.com](mailto:Elisya.Foo@hannover-re.com). In the mean time, keep yourselves free on July 13 because we hope to see you at Carnegie's!



## Mount Kinabalu Expedition

Mount Kinabalu is not only one of the most accessible and spectacular mountains in the world, but also the highest in South-East Asia. The mountain was first climbed by Sir Hugh Low in 1851. A mere 156 years or 5 billion seconds later, the ACTUARIAL SOCIETY OF MALAYSIA will attempt to put its flag at the top of the summit. We want as many members as possible to witness this special and historic

occasion.

Sir Hugh took 9 days to reach the summit plateau, travelling in a party of 42 people. ASM will attempt the whole trip in 4 days:

**Day 1:** Flight to Kota Kinabalu and to stay in Kinabalu Park. Kinabalu Park is 2 hours drive from Kota Kinabalu.

**Day 2:** An early start (7-8 am) from Timpohon gate (1,866m) up

to Lapan Rata (3,262m) via the summit trail. (Average trekking time 4-5 hours)

**Day 3:** For those attempting the peak, start at 3am in order to catch the sunrise. Then, breakfast for all at Laban Rata. And finally back down to Kinabalu Park

**Day 4:** Return to KL

The best time to visit Kinabalu is during the dry season from ➡



## Mount Kinabalu Expedition



February to April. The proposal is to do it in mid-February, to be as far away from the exam period as possible.

More than 20,000 make the 8.7 km climb to the summit of the mountain a year, a steep ascent of earth steps and wooden ladders, but one which remains basically a two day walk, rather than a climb, within the reach of anyone who is reasonably fit and healthy.

The following training schedule has been designed to prepare you for the trekking expeditions to Mount Kinabalu. It is recommended that, you adhere to this training program so as to increase your fitness and endurance level and

also be supported by your own training schedule. Taken seriously, this activity may lead to a better mental preparedness and healthy lifestyle.

Below is the proposed weekly training schedule

Venue	
Meeting place	Batu Caves Steps (from July) AND Bukit Gasing jungle trail (from August) Main entrance to Hutan Pendidikan Bukit Gasing, Jalan Tanjung 5/4, Off Jalan Gasing, Section 5, Petaling Jaya, Selangor.
Time	Selected weekends - start around 6.45am!



From September, day out trekking expedition, usually on Sunday.

Venue	
Gunung Angsi (2706 Ft) Seremban R&R - 275km signage @ 7.30am	On the way to Kuala Pilah, Negeri Sembilan. Stop at the Ulu Bendul Rec- reational Park. 1 1/2 hr from KL/PJ (3 1/2 hrs up and 3 hrs down)
Gunung Nuang (4178 Ft) Bt 18, Police station, Ulu Langat @ 7.30am	Highest mountain peak in Selangor. Drive to the end of Ulu langat road. Park your car at the Jabatan Perhutanan car park and walk to LOLO. Bring torch lights ( 6 hrs up - 5 hrs down ) 1 hr from KL, 1 1/2 hr from PJ (Note: This is a tough climb!)
Gunung Datuk, (2900 Ft) Seremban R&R - 275 Km signage @ 7.30am	Take the old Seremban - Melaka Road, pass Rembau town. 2 hrs from KL / PJ ( 3 hrs up and 2 1/2 hrs down )

Those interested or wanting more information please contact Loke Chang Yueh ([changyueh-loke@hannover-re.com](mailto:changyueh-loke@hannover-re.com)). Only limited places available.

## Interview with Mr. Lee Jiau Jiunn

by Jeremy Lim

ASM recently had the pleasure of interviewing Mr. Lee Jiau Jiunn, the appointed actuary of AIA, on a wide variety of topics, ranging from the actuarial career field to the current state of the life insurance industry, and of course the World Cup! Your journey through one of the distinguished minds of Malaysia's actuarial field begins here!

### Career

**Could you give us a brief summary of your career, beginning from after your graduation to your current position in AIA? What compelled you to take up the actuarial career path?**

I started work as an actuarial trainee with Sun Alliance Life Limited in Wellington, New Zealand in 1988. After I completed all my actuarial examinations and obtained my Fellow qualification in 1995, I moved back to Malaysia in 1996.

The first company I worked for in Malaysia was Sime AXA Assurance Berhad as the Appointed Actuary. In year 2000, I decided to move to my current employer, American International Assurance Company Limited, also as the Appointed Actuary. I stay in AIA until now.

From my business card, many people may have noticed that I hold a Bachelor as well as a Master of Civil Engineering degree. When I graduated from the university, I felt that my strong interest is in the area of finance and investment industry, and hence the switch to actuarial science.

**What has been the highlight of your career thus far?**

The day I received the pass list that stated that I completed all the examination requirements to qualify as Fellow. You can tell people from then on that you have completed one of the toughest examinations in the world.

**Could you give some advice to those just starting out in the industry, on how to balance work with study/life commitments, speaking as a person who has traversed the long hard road to becoming an actuary?**

The right balance of study, life and work is perhaps the most important act that you ever need. My advice is be yourself and enjoy it.

I started my examination preparation months before the examination date, and spent the one-month before the exam date doing revision and past exam questions only. It worked

very well for me because I am not the last minute person.

Also, exam is not the only thing in life and hence we have to enjoy everything we do. Many of us have already obtained one degree before embarking on the actuarial examination, and we just do not feel like wanting to put ourselves through another long hard study. I found that when you do spoil yourself once in a while, eg. Have a rest day, go to a movie, or just doing nothing, it actually helped to rejuvenate your physical strength and mental self-satisfaction. Many actuarial students feel that there is no life when compared to their friends in other industries; they feel that actuarial career is a torture. I think it need not be.

### Current issues in the insurance industry

**What is your opinion on Takaful/Islamic insurance, given the recent issuance of licenses to sell Takaful products to certain companies? Do you see this as an untapped/growth market, or is Malaysia still not ready for it?**

I am very excited about this recent development; I think it augurs well for the actuarial profession and the insurance industry. Many Malaysians are still under insured and/or not having insurance at all. Through more channels and products, more lives and assets will be protected and more people will benefit from having insurance.

Takaful is still pretty new both in Malaysia as well as throughout the world. There will be many opportunities for actuaries. I think Malaysia is ready for it.

**BNM has issued some JPI's recently to deal with the issue of agents commissions, e.g. revision of Minimum/Maximum Sum Assured multiples, regulations on ROP (Refund of Policies), reduction of Banca commissions. What are your thoughts on this item?**

The intention of the guidelines is to ensure policyholders receive value and benefit; this is good. Although there are other debates and issues to consider, I believe some agreements can be reached. Insurance is still by and large sold rather than bought, and hence we still need to ensure an orderly market.

## Interview with Mr. Lee Jiau Jiunn

⇒ **Related to BNM, they have just released the Revised Concept Paper on RBC. What is your opinion on the current regulations being imposed by BNM on capital requirements for insurance companies?**

It is necessary to have a good capital framework to ensure that the policyholders' benefits are protected. It brings financial discipline to the insurance companies and this can provide a safety margin to consumers. It is important to ensure adequate capitalisation according to the risks assumed by the insurance companies.

**Around middle of last year, the government allowed 30% of investments to be allocated to foreign markets. Do you think that the move has been good, or remains to be seen?**

I always like more options for policyholders; therefore I am optimistic about the move. However, foreign currency investment brings a new risk to policyholders, and hence insurance companies have an obligation to policyholders to ensure they fully understand the risk involved. Actuaries play a key role in ensuring proper communication.

**Looking towards the future, what do you think will be the future life/general insurance products that will be available to the public?**

For the short to medium future, the traditional products will still be in demand. Investment-linked products will be here to stay due to the mentality of buy term invest the rest. Medical plans are important to Malaysians and this will remain. However, changes in the capital requirement, eg. RBC, may make a product shift much quicker.

I think we will also see more investment type of products, such as structured investment product and foreign currency plans becoming more popular.

### Future of Actuaries in 21st Century

**What do you feel the current career opportunities are like for actuarial graduates? Do you think that there are demands in alternative markets (e.g. energy, oil and gas, fund management, investments) for actuaries other than insurance here in Malaysia?**

The demand for actuarial skill will still be increasing, and therefore the future for the profession is still bright. We still

see shortage of actuarial staff in life insurance sector, and there is a strong need to expand actuarial expertise in general insurance sector. Moreover, Takaful will grow significantly, and hence I believe Takaful actuarial skill will be required.

As to the examples given above which cover much wider fields, I doubt it can happen very soon.

**With the progress of IT, and consumer tastes/knowledge advancing all the time, what skills should actuaries develop to stay relevant?**

In addition to our core technical skill training, I suggest actuaries should acquire other skill such as communication skill and marketing skill. Usually actuaries are not good communicators, but we ought to. This is because we are in a critical position to ensure policyholders know what they buy. Moreover, we need to communicate our actuarial findings to the Board so that they too appreciate the risks the company is dealing with.

Good marketing, business and product knowledge is also relevant because we can then design and price products that are of benefit to consumers at large.

**On education, there have been many complaints that most of what was studied in the actuarial courses offered are not beneficial to the work environment. As a qualified actuary, what's your take on this issue?**

Personally, the education process that I went through had been beneficial. The education syllabus has been well thought of; but of course, there is still room for improvement. We have seen that the professional bodies have been modifying their syllabus to ensure the students are acquiring up-to-date and relevant skill set.

### World Cup

**Who are your favourites going into the World Cup?**

I enjoy Brazil. It is their way of playing entertaining football that makes football alive and interesting.

**Which is more likely to happen first; a graduate qualifying as an actuary, or Malaysia qualifying for the World Cup?**

I sincerely hope Malaysia will play in the World Cup one day. For now, I would put my bet that qualifying as an actuary has a much higher certainty.





# Unwanted publicity?

by Sim Ng, PhD, FIAA, FSA

It is rare for actuaries to get publicity, be it good or bad. In fact, not many members of the general public have heard of the actuarial profession, let alone understand what it does. Hence, it was a surprise to find a 3-page article in the Economist edition of 28th January 2006 devoted to the role of actuaries in the pensions industry.

In the Economist article, "Actuaries and the pensions crunch – when the spinning stops", it was written that:

"False precision and the reckless approximation have defined the actuarial profession's role in the crises that has enveloped corporate pensions on both sides of the Atlantic. Although actuaries have not been the only cause – companies, trustee boards, governments and accounting rules have all played their part – they have been surprisingly hapless at their main task: forecasting funds' future liabilities and assessing how many assets will be required to meet them.

Their failure has hastened the collapse of final-salary (defined-benefit) pension schemes, many of which have ballooning financial deficits... As a profession, actuaries stand accused of negligence on a grand scale."

One would have expected that such a negative publicity in the print media would have generated some response from the actuarial profession. At the very least, it should have sparked a debate on the role of other parties, such as companies,

"False precision and the reckless approximation have defined the actuarial profession's role in the crises that has enveloped corporate pensions on both sides of the Atlantic."

trustees, governments and accountants, in the corporate pensions crunch. However, it is now almost two months since the publication and there does not appear to be any response from any of the actuarial professional body.

The major criticisms of pension funds mentioned in the article were:

- ◆ Pension funds held as much as 80% - 90% of their assets in equities, which were a poor and risky match for the long-term "bond-like" liabilities of pension funds, where regular payments are payable by the fund for the lifetime of its members.

- ◆ The calculation of pension fund liabilities depended on its asset allocation. This means that the discount rate applied to future liability cash-flows was determined by the expected investment return of the assets backing the liabilities, which in turn depended on the nature of the assets. Since higher returns were expected from equities, a higher proportion of equity assets resulted in lower liabilities.

Indeed, not all actuaries were supportive of these principles in the management of pension funds. Actuaries were, also, by no means, the only group to be blamed for the state of the corporate pension funds in Britain and the USA. The companies themselves, who were only

too happy to post profits from their pension schemes during the inflationary years and trustee boards, which did not oppose such decisions, were also to blame. In addition an unprecedented increase in the longevity of pension schemes' members has also unexpectedly increased the cost of pension benefits.

Turning to the Hong Kong market, we would find quite a different scenario, i.e. one that is unlikely to have the extensive problems encountered in Britain and the USA. This is due to the nature of corporate retirement schemes in Hong Kong, which provide lump-sum resignation or retirement benefits rather than life-time pensions. Hence. The issues relating to longevity risks are not relevant. In addition, the impact of low long-term interest rates is less severe. Overall, the corporate retirement schemes in Hong Kong are in far better shape.

To summarize, actuaries are not infallible and need to recognize that forecasting future liabilities is difficult and subject to errors. After all, it is well known that economists seldom get their GDP and inflation forecasts correct! Hence, how can actuaries expect to be super-natural beings? It is then more important and critical for actuaries to highlight the shortcomings and risks in their forecasts so enable appropriate decisions to be made by trustees or directors of companies.

(Sim Ng is Chief Financial Officer of Commonwealth Bank Group, IFS North Asia. She is President-Elect of the Actuarial Society of Hong Kong (ASHK) and can be reached at [sim.ng@cba.com.hk](mailto:sim.ng@cba.com.hk). This article first appeared in April 2006 issue of ASHK Newsletter and is reproduced with permission. The Economist's article can be found on [http://www.actuaries.org.hk/doc/Economist%20Article%20\(28%20Jan%202006\).htm](http://www.actuaries.org.hk/doc/Economist%20Article%20(28%20Jan%202006).htm))

# No title yet...

by Lim Ling Feng

Consider a health insurance contract where:

1. Premiums are payable continuously while the life is in the healthy state at rate  $P$  per annum.
2. An annuity is payable to the policyholder at the rate of  $A = 50,000$  per annum while the life is in the disabled state.
3. A death benefit of  $S = 100,000$  is payable on transfer to the dead state from either live state.
4. The life is aged 30 at issue, and the term is 30 years.

Sounds like an examination question? Some might even say, “Easy. I have done this in the exams. It is a multiple state model. I know the general equations and if you give me the parameters, I will solve it in no time.”

So, we will have the following equations,

$$V_1(r, \infty) = -P \int_r^{\infty} e^{-\delta(t-r)} {}_{t-r}p_{x+r}^{\overline{11}} dt + \int_r^{\infty} e^{-\delta(t-r)} {}_{t-r}p_{x+r}^{\overline{11}} \mu_{x+t}^{12} V_2(t, \infty) dt$$

$$V_1(r, \infty) = -P \int_r^{\infty} e^{-\delta(t-r)} {}_{t-r}p_{x+r}^{\overline{11}} dt + \int_r^{\infty} e^{-\delta(t-r)} {}_{t-r}p_{x+r}^{\overline{11}} \mu_{x+t}^{12} V_2(t, \infty) dt$$

And to complicate things, what if the force of mortality is a function of the age? For example,  $0.12345 + 12345x+r$ ?

Such a question may be too much to swallow under examination conditions. Nevertheless, it is a good alternative as to how a life or health insurance product could be priced and reserved for.

This model is the essence of Professor David C M Dickson’s presentation on “Premiums and Reserves for Life Insurance Products” on 14 March 2006. Despite the drizzling rain, more than 40 participants turned up for the event.

The much-anticipated event began with a brief introduction of the guest speaker by the emcee, Mr. Kwek Cheng Seng. Then, Prof. Dickson took over the floor and he started off with the introduction of the common use of multiple state models in tackling actuarial problems, notably in premiums and reserves calculation for health and disability products.

The Chair of Actuarial Studies from University of Melbourne also highlighted the help of mathematical tools in solving differential equations involved in multiple state models (Kolmogorov anyone?). For this particular presentation, the professor chose Mathematica as the problem-solving tool.

The talk was mainly split into 4 sections. After the introduction, Prof. Dickson led us through Section 2 with 3 graphical examples of multiple state models, namely the “alive-dead”, “permanent disability” and “disability income insurance (DII)” models. For those who haven’t a clue what these are: What were you doing in college?

Section 3 revolved around the derivation of the general Kolmogorov equations which play an important role in arriving at the probabilities for any multiple state models. Prof. Dickson then demonstrated a numerical example on the DII model where Mathematica was drawn on to full utilisation.

In the last Section, he brought our attention to insurance mathematics where the emphasis was shifted to how to arrive at premiums and reserves by deriving of equations for premium, disability income and death outgo. Prof. Dickson then followed up with another numerical example where Mathematica was once again brought into the scene. The benefits of Mathematica were made even more apparent with its ability to present results in graphs and tables.

All in all, the talk was an informative one. With the use of a powerful tool like Mathematica, it left us pondering the option of valuing premiums and reserves using multiple state models. Does it work on health/disability insurance here? Could it help us to do a more accurate evaluation? All these remain in a territory that we have yet to explore.

Professor David Dickson’s notes on “Premium and Reserves for Life Insurance Products” are now available for download at <http://actuaries.org.my/new/download/DavidDickson-PremiumsandReservesforLifeInsurance.pdf>



## Introducing Bayesian Networks for Modelling of Operational Risk

by Yoon Yew Khuen

Widely publicised cases of insurance company and other corporate failures over the past decade have resulted in increased scrutiny by various industry regulators on risk management and corporate governance of supervised entities. Going forward, financial institutions will be expected to conduct internal modelling of enterprise risks and demonstrate that the process is embedded within the overall risk management framework. The reader will be familiar with developments in the Basel II and Solvency II supervisory frameworks, in addition to principles and standards for solvency capital published by the International Association of Insurance Supervisors<sup>1</sup>. Therefore, no further details will be discussed here except to observe that operational risk continues to be one of the more enigmatic and controversial elements of these enterprise risks. In this article I hope to contribute to the discussion by making a high level review of Bayesian Networks (BNs) as a potentially suitable model for operational risk.

### Why Bayesian Networks?

Certain features of BNs make it an interesting candidate for an OR model:

- (i) Allows causal modelling of OR factors;
- (ii) Incorporates qualitative and quantitative data in a mathematically tractable manner; and
- (iii) Application of bayesian statistics enables BNs to adapt to new data in a measurable way.

These features are advantageous for a number of reasons. Causal analysis has been mentioned in many OR literature as a necessary step in classifying an event as an OR loss rather than other forms of financial loss. Causal models are also ideal for scenario testing as well as helping risk managers to understand the sources of OR. While it can be said that all statistical models involve a degree of subjectivity, BNs explicitly incorporates qualitative information through the causal structure and prior probability distributions. This is crucial for OR models as data is often sparse and needs to be supplemented by expert opinion. Perhaps just as important, such a model needs to adapt well when data is actually available so that the model is not locked into a purely subjectively determined structure.

### Basics on BNs

BNs belong to a subset of artificial intelligence systems known as expert systems. These have had scientific applications for decades - for example, medical diagnoses, forensic science using DNA analysis and even the Microsoft Office helper. Basically, they carry out probabilistic reasoning along a predetermined set of rules specified by the expert. BNs rely on graph theory to express the causalities, conditionalities and correlations between variables. Here is an example of the typical relationships represented by graph theory:

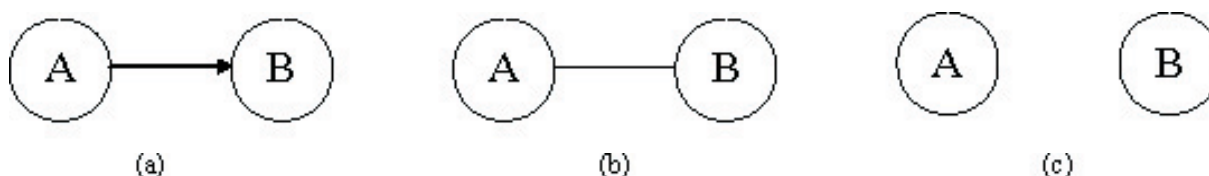


Figure 1 Graph theory representation of causation, correlation and independence

Fig. 1(a) shows a causal relationship, whereby a change in the random variable A causes a change in random variable B. In Fig. 1(b), A and B are correlated but no causation is implied. Fig. 1(c) shows A and B to be uncorrelated. These are the building blocks of BNs, which can typically have up to many tenths of such variables (also known as nodes) connected in a large network of causal relationships. Unconditional nodes (e.g. A in Fig. 1(a)) will have unconditional probabilities of its different states specified whereas conditional nodes (e.g. B in Fig. 1(b)) will have probabilities of its states expressed conditional upon states in A.

### Wet Grass Example

We now consider a famous example to illustrate how Bayes' Theorem and basic conditional probability is applied to perform probabilistic reasoning. In this example, grass in a garden is observed in the morning to be either wet or dry. If the grass is wet it could be due to either the sprinkler being on or some rain falling earlier on. The given probability of rain is 0.1 whereas the

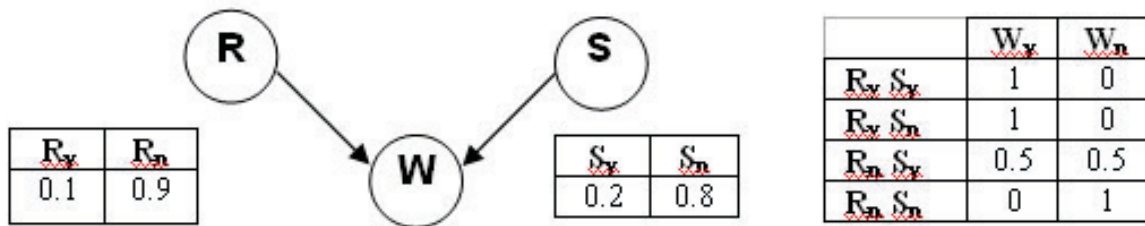


<sup>1</sup> See <http://www.bis.org>, [http://ec.europa.eu/internal\\_market/insurance/solvency2/index\\_en.htm](http://ec.europa.eu/internal_market/insurance/solvency2/index_en.htm), <http://www.ceiops.org> and <http://www.iaisweb.org>.



## Introducing Bayesian Networks for Modelling of Operational Risk

⇒ probability that the sprinkler is on is 0.2. The graph and probabilities are shown in Fig. 2.



The subscripts represent the state of the variable e.g. Wy = wet grass, Sn=sprinkler not on etc.

Figure 2 Sprinkler example.

The probability of the grass being wet *conditional* on the states of the sprinkler and rain is also shown in Fig.2. Thus, for example, given that neither the sprinkler was on nor was there rain, the probability of the grass being dry is 1. As a first step, we find the joint density of R, W and S. Using a fundamental result of conditional probability and observing that R and S are independent we know that:

$$P(W,R,S) = P(W|R,S)P(R)P(S)$$

Thus, multiplying the unconditional probabilities of R and S into the table of conditional probabilities, we get the resulting joint distribution in Table 1(a) below. By summing up the columns, we get the marginal or unconditional probabilities  $P(W)$ . For example, at any given moment, the probability of grass being wet is 0.19. Marginal probabilities for other variables can be obtained by summing up relevant cells.

Suppose that we received the information that the grass is wet,  $W_y$ . We might then be interested to know if this was caused by

	$W_y$	$W_n$
$R_y S_y$	0.02	0
$R_y S_n$	0.08	0
$R_n S_y$	0.09	0.09
$R_n S_n$	0	0.72
	<b>0.19</b>	<b>0.81</b>

(a) Joint distribution

	$W_y$	$W_n$
$R_y S_y$	0.02	0
$R_y S_n$	0.08	0
$R_n S_y$	0.09	0
$R_n S_n$	0	0
	<b>0.19</b>	<b>0</b>

(b) Incorporation of information on wet grass

	$W_y$
$R_y S_y$	0.1053
$R_y S_n$	0.4211
$R_n S_y$	0.4737
$R_n S_n$	0
	<b>1</b>

(c) Normalisation

	$W_y$
$R_y S_y$	0
$R_y S_n$	0
$R_n S_y$	0.09
$R_n S_n$	0
	<b>0.09</b>

(d) Incorporation of information on no rain

Tables 1 Manipulation of the joint distribution

rain or the sprinkler. We would want  $P(R_y|W_y)$  and  $P(S_y|W_y)$ . Using Bayes' Theorem we can find these as follows:

$$P(R_y|W_y) = \frac{P(R_y W_y)}{P(W_y)} = \frac{0.1}{0.19} = 0.5263 \text{ and } P(S_y|W_y) = 0.5789$$

Another way to arrive at these results is to set the probabilities of all events involving  $W_n$  to 0 (Table 1(b)). Then normalise the remaining probabilities (producing Table 1(c)) before extracting the required values by marginalising (e.g.  $=0.1053 + 0.4737=0.5790$ ). The normalisation process has the effect of setting  $P(W_y)$  to 1, which is effectively making the statement that "the grass is wet". Thus, we see that with the evidence of wet grass the probabilities of both rain and the sprinkler being on have increased substantially, which is what we would expect.

Next, suppose we received additional information that it did not rain earlier. We would set all events involving  $R_y$  to 0, producing Table 1(d). It is trivial to see that normalization then results in  $P(S_y) = 1$ . This is intuitively obvious: if the grass is wet and it was not caused by rain, then the sprinkler caused it.

### BN Software Example

One practical advantage of BNs is the availability of software that can be downloaded free-of-charge from the Internet<sup>2</sup>. The following screen captures illustrate what the wet grass example looks like on XBaies. Fig. 3(a) shows the marginal distributions

<sup>2</sup> Some of the popular ones are Netica (<http://norsys.com>) and Hugin (<http://www.hugin.com>). XBaies is available at <http://www.staff.city.ac.uk/~rgc>.

## Introducing Bayesian Networks for Modelling of Operational Risk

at the outset without any information – these correspond to the result in *Table 1(a)*. When information (“grass is wet”) is entered into the Wet Grass node, the whole network is immediately updated to show the new marginal probabilities. *Fig 3(b)* shows the results after the calculations illustrated in *Tables 1(b) and (c)* have been carried out including the marginalisation exercise to derive marginal distributions for Rain and Sprinkler On. Finally, *Fig. 3(c)* shows what happens when the additional information (“no rain”) is entered into the Rain node.

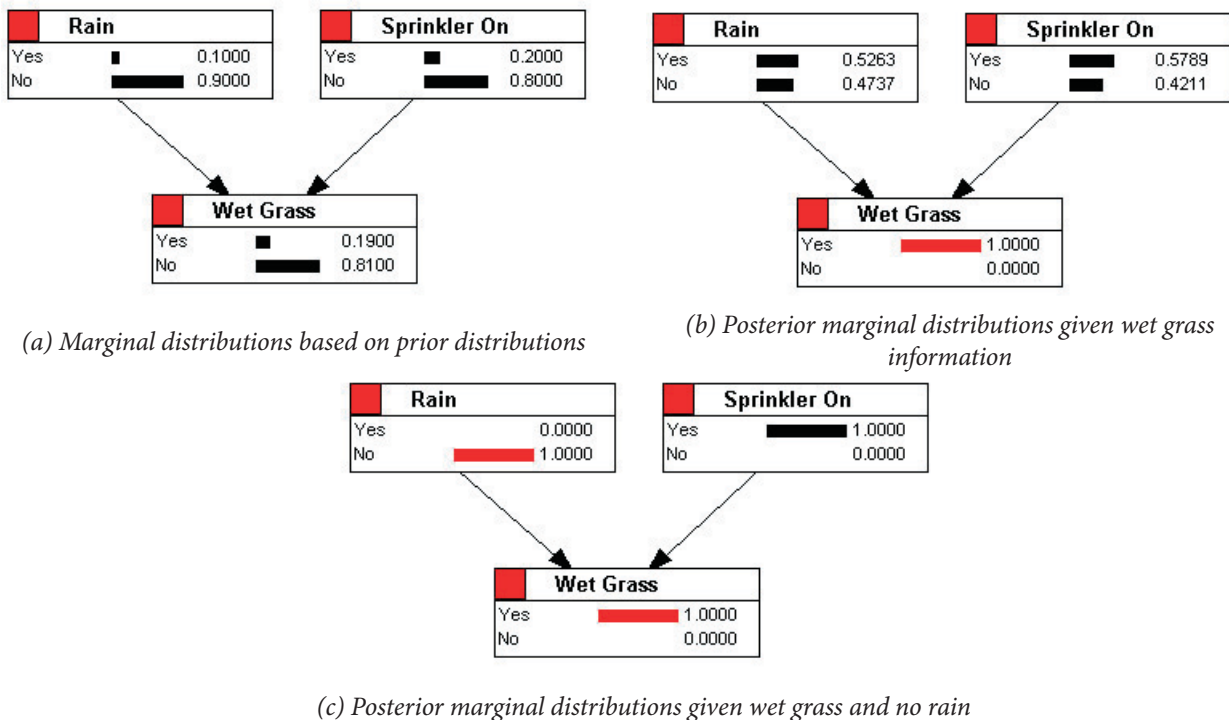


Figure 3 XBaies screen capture of wet grass example

### Insurance Company Application

We consider a simple insurance-specific hypothetical example for modelling the cost of claims fraud over a time period, say monthly. After conducting an exercise of interviewing claims and underwriting department personnel, the risk manager at ABC Insurance Bhd produced a BN as shown in *Fig. 4*. These show the prior marginal distributions for qualitative rating of the level of claims and underwriting control which depend on factors such as experience and reliance on ancillary support (e.g. branch, loss adjusters and system automated checks). External factors such as business volume and economic cycle are also considered. Once the prior unconditional distributions (for unconditional nodes, e.g. Business Volume and Economic Cycle) and prior conditional distributions (for conditional nodes e.g. Claims Control and Fraudulent Claim) are specified the software immediately produces the marginal distributions as shown in *Fig. 4*. The distributions may be derived based on sample statistics (e.g. study of past claims show that adjusters are engaged in 60% of cases) or expert opinion (times are good hence only 10% of downturn occurring in the following month or 60% of policies will result in fraudulent claims when the economy is poor and underwriting control is poor). The structure itself will likely be defined purely from expert opinion on how the factors impact each other.

As an example of using BNs for scenario testing, the Economic Cycle node can be set to “Down” to indicate a period of economic downturn. The result is shown in *Fig. 5*. We can see that the probability of fraud along with distribution for cost of fraud has gone up significantly. For causal analysis, a node such as Fraudulent Claims can be set to “Yes” and the posterior marginal distributions will show that incidence of fraud is likely to be caused by poor economic environment along with lax underwriting control as can be seen from *Fig. 6*. The downstream effect of fraud incidence can be seen in the shift in the distribution for Cost of Fraud node.

### Simulation

BNs can also be used for simulation. One possible algorithm is to begin by taking random samples at the unconditional nodes then the adjacent conditional nodes can be sampled conditional on the sampled outcome at the unconditional nodes. Once this has been carried out all the way through one configuration of the whole BN is obtained (with specific values at each node) and

## Introducing Bayesian Networks for Modelling of Operational Risk

one simulation run is completed. More efficient algorithms are available to handle simulations on the BN when information is entered at any of the nodes.

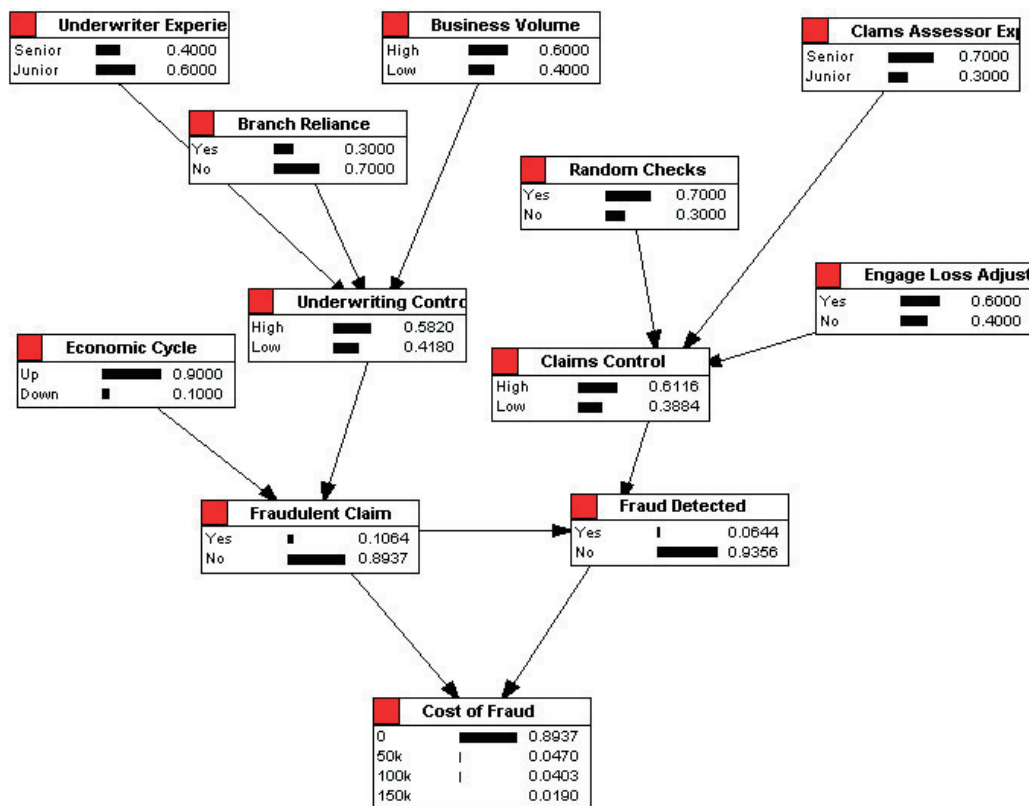


Figure 4 BN for cost of insurance fraud

### Bayesian Updating

BNs offer the flexible feature of *learning* from actual data. This is when the BN is set to update the probabilities at each node based on actual data received. For example, if cases of fraud continue to emerge even in favourable economic cycles, the conditional probabilities in the Fraudulent Claim node will be updated. Its marginal distributions will shift from the current 10:90 (Yes:No) distribution to something perhaps closer to 20:80. The methodology underlying this learning is again Bayes' Theorem. This involves a *Dirichlet* prior distribution which forms a conjugate prior distribution with a *Multinomial* likelihood (dataset) to produce a Dirichlet posterior distribution with updated parameters in the light of the dataset. The Dirichlet and Multinomial distributions are generalised cases of the more famous two-parameter Beta and Binomial distributions respectively. Further details on BN learning can be obtained from the further reading given below.

### Discussion

Many aspects of BNs have not been covered in this article (e.g. model selection, continuous distributions and even the underlying computational algorithms). Interested readers are welcomed to consult the further reading. At this point, it is also important for me to highlight certain challenges in using BNs. The main difficulty with using BNs is that it can get complex very quickly with very large tables of conditional probabilities to specify. For example, for a binary node which is conditional on 3 binary nodes, the table of conditional probabilities will have 16 cells. If all the nodes were ternary, this increases to 81. Another issue is the non-uniqueness of the BN structure as the causal linkages of the variables and even the choice of variables can be fairly subjective, resulting in more than one possible configuration that fits the data. However, it is worth remembering that any financial model is replete with subjective assumptions. It may well be that a model that explicitly allows for such subjective elements may be preferable due to increased transparency. As stated earlier, this is an exploration of new methods and will need to be rigorously tested. In fact, the reader is cautioned that my perspective is very much a theoretical one. I would welcome a chance to talk (over some coffee) with anyone who is considering being the first to construct a BN for modelling OR in a financial institution.



# Introducing Bayesian Networks for Modelling of Operational Risk

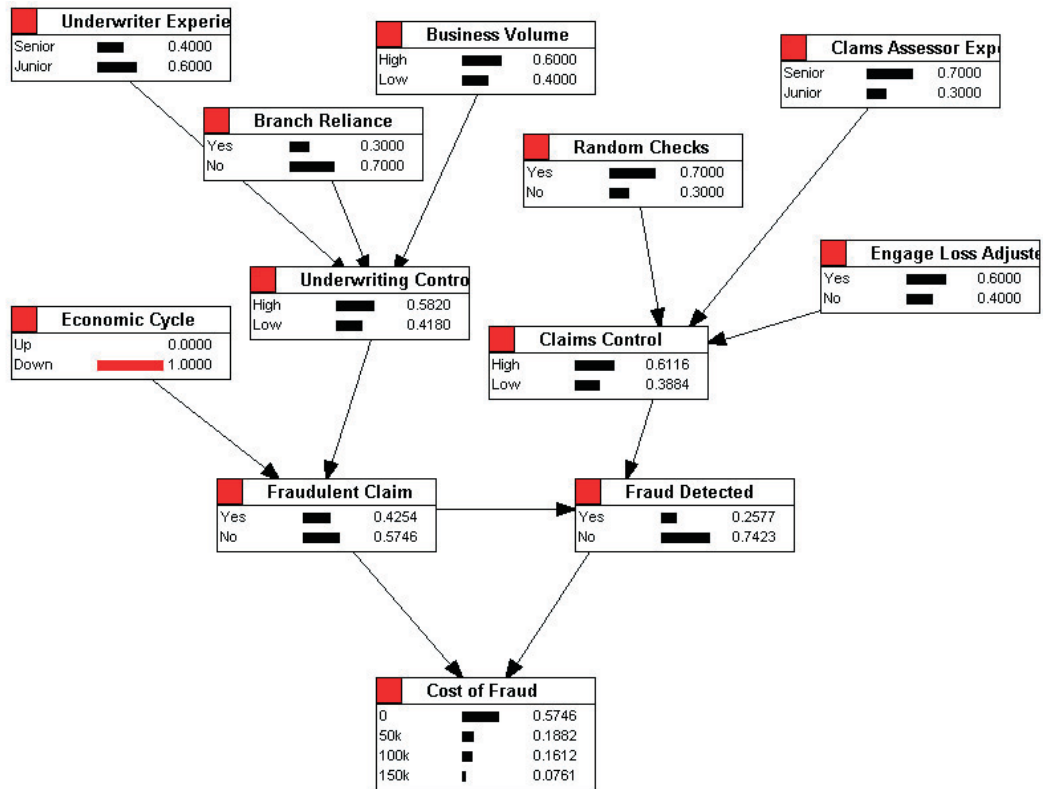


Figure 5 Scenario testing for economic down cycle

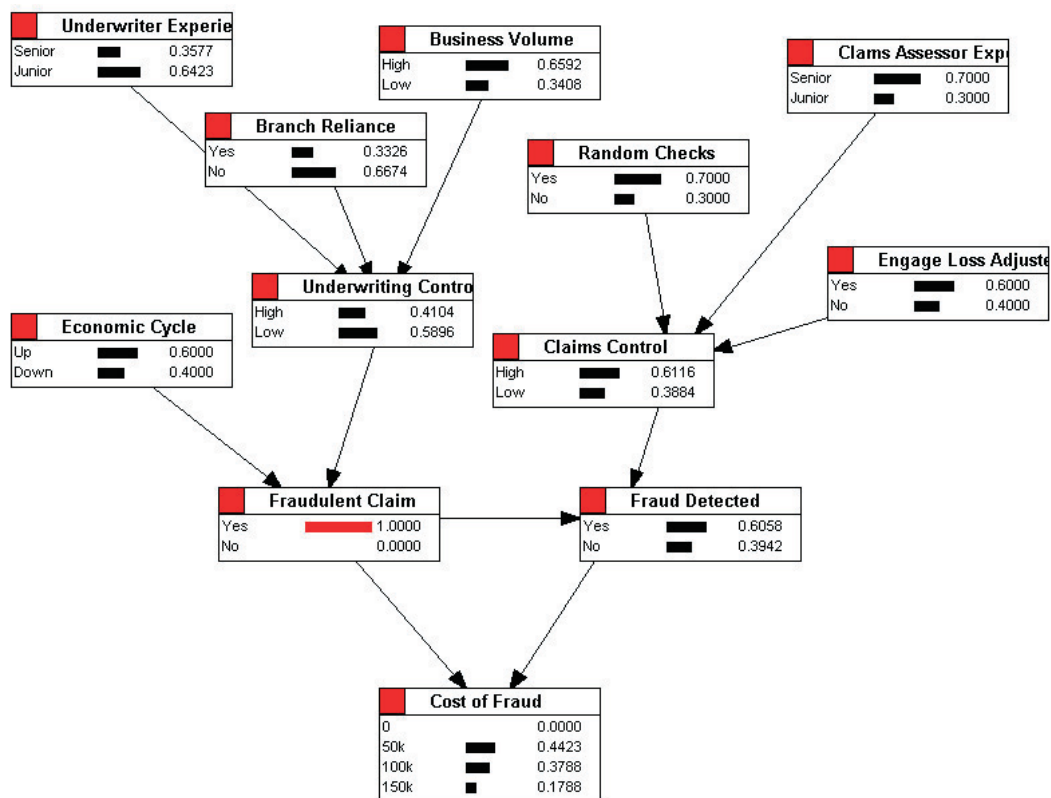


Figure 6 Causal analysis of incidence of fraudulent claim

## Introducing Bayesian Networks for Modelling of Operational Risk

### Further Reading

Some readings are available online and in published books, although most tend to be at a fairly high level. Here are some recommendations which, while not being exhaustive, might be useful introductory reading:

Those who want to follow up on the mechanics of BNs should consult this award winning textbook:

COWELL, R. G., DAWID, A. P., LAURITZEN, S. L., SPIEGELHALTER, D. J., (1999). Probabilistic networks and expert systems. Springer-Verlag.

Here are some books published that discusses OR at various levels:

ALEXANDER, CAROL (2003). Operational Risk: Regulation, Analysis, and Management. Prentice Hall.

CRUZ, MARCELO G. (2002) Modeling, measuring and hedging operational risk. Wiley.

HOFFMAN, DOUGLAS (2002). Managing operational risk: 20 firmwide best practice strategies. Wiley.

KING, JACK L. (1999). Operational Risk. Wiley.

VAN DEN BRINK, GERRIT J. (2002). Operational risk: the new challenge for banks. Palgrave.

OR information on the Internet:

TRIPP, M.H.; ET AL (2004). Quantifying operational risk in general insurance companies.

<http://www.actuaries.org.uk/files/pdf/sessional/sm20040322.pdf>

FINANCIAL SERVICES AUTHORITY (2005). Operational risk management practices – feedback from a thematic review.

[http://www.fsa.gov.uk/pubs/international/or\\_practices.pdf](http://www.fsa.gov.uk/pubs/international/or_practices.pdf)

FINANCIAL SERVICES AUTHORITY (2002). CP142: Operational risk systems & control.

<http://www.fsa.gov.uk/pubs/cp/cp142.pdf>

Operational Risk Research Foundation.

<http://www.orrff.org/index.html>

BN information on the Internet:

MURPHY, KEVIN (1998). A Brief Introduction to Graphical Models and Bayesian Networks.

<http://www.cs.ubc.ca/~murphyk/Bayes/bnintro.html>

Association for Uncertainty in Artificial Intelligence. <http://www.auai.org/>

### Acknowledgements

I would like to thank my employer for providing me the time and resources to prepare this article and the Actuarial Society of Malaysia for this opportunity to share these thoughts with the actuarial community. All views expressed here are my own and therefore not necessarily shared by my colleagues or my employer.

Yoon Yew Khuen works in the Insurance Supervision Department of Bank Negara Malaysia

# Sudoku

by Lim Wei Wei

I recently found that there have been a lot of books written about Sudoku during my visits to bookstores. They even have special corners that just display all the books about Sudoku. Sudoku has become so popular these days that it is now becoming a fixture in daily newspapers and magazines.

Sudoku is actually from the Japanese language. “Su” means number and “Doku” refers to the single place on the puzzle board that each number can fit into. Although the name is Japanese, its origins are actually European and American. In the 18th century, a Swiss mathematician, Leonhard Euler, developed the concept of “Latin Squares”. Under this concept, the numbers in a grid appear only once, across and up and down. In the late 1970’s, a puzzle called Number Place was developed by an independent puzzle maker and was published in Dell Magazines in the US. This Number Place is actually applying Euler’s concept with a 9 x 9 square grid.

Thus the most common form of Sudoku is the 9 x 9 grid, which we see in most of the books and newspapers in Malaysia. Of course there are many variants of this game: there are for example, 5 x 5 or 6 x 6 grids. In fact, there are even 16 x 16 and 25 x 25 grids for those who really love the game!

Sudoku is a puzzle that involves numbers. The solution is obtained by removing all but one of the possibilities through the method of elimination. For example, let us take the most common form of Sudoku, the 9 x 9 grid. There is only one important rule to remember to complete a Sudoku: Each 3 x 3 box, as well as each row and each column, must contain all the numbers from 1 to 9.

I started playing this game a few months ago when I came across one in the newspapers. For that puzzle, I spent almost two hours to solve it!

I had almost given up at the initial stage after trying for an hour. I felt so unsatisfied as to why I could not solve it so I kept trying until I made it. Ever since then, the first thing that I will look for when I read the newspapers is the Sudoku column. I cannot recall how many puzzles I have tried to date, but the time that I need to solve each puzzle has now improved. Of course there are still times when I come across difficult puzzles where I would need more than half-an-hour to solve.

I have not looked into books or articles that mention about the methods of solving Sudoku. Up until now, I am just relying on my own methods to solve it. The first thing that I would do is to find the number that appears most among the 3 x 3 boxes, and try to use this number for the other 3 x 3 boxes that do not have this particular number. Say for example, under the puzzle illustrated below, the number that appears the most is the number 8. Within the 3 x 3 boxes A to I, only boxes D, H and I do not have the number 8. For box H, the only possible cell for the number 8 is cell at coordinate (9,4). The 2nd column of box H cannot have the number 8 as it already appears in box E. The 3rd column of box H also cannot have the number 8 as it is already appears in box B.

Using the same logic, I will try to fill as many numbers as I possibly can. I will then solve for the rest of the cells by listing out all the possible numbers that can be used in each cell and applying

elimination logic.

I find Sudoku fun and challenging. It does not require any special knowledge or skill to solve the puzzles. People of any age and background can solve the puzzles. Playing Sudoku may even be able to help stimulate our brains: Some famous British celebrities have testified to its benefits as a mental workout, while the Teachers magazine has recommended Sudoku as a brain exercise in classrooms. There are even suggestions that say playing Sudoku helps slow down the progression of brain disorder conditions such as Alzheimer’s. Perhaps one day in the future, someone may discover that playing Sudoku actually helps us improve on utilizing a higher percentage of our brains!

A	B	C
D	E	F
G	H	I

		9				8		
6		8			3			4
	1		9		8			5
7		1						8
	4			8			2	
						5		3
8			2		9		4	
4			1					6
						2		



## Education newsletter

by Education Sub-Committee

**D**ear Students

Welcome to the education section of the newsletter. One of the objectives for 2006 for the Education Committee of the ASM is to have more frequent interaction and contact with students. One way in which we hope to achieve this, is by introducing a regular section in the newsletter that will be devoted to students and educational matters. The focus of this section will be towards educational matters, and we will try to give equal balance to all professional bodies to which students are currently subscribing.

To provide the best possible service, we would welcome your feedback and ideas on how we can better support you. Any ideas, comments or suggestions can be posted to the education committee on the website.

### Examination Results

First of all, June is the month in which many students received results for the first sitting of exams for 2006. For those who have received good news this month, we would like to extend a warm wish of congratulations on your success - pat yourself on the back, and keep up with the good work.

For those not so lucky, I know from own experience that this is a bitter pill to swallow. Don't be too discouraged - pick yourself up, dust yourself off, and get back into the game as quickly as possible. If you are really devastated, or perhaps just looking for a few words of encouragement to get you back on track, consider contacting one of the career advisors (please

see Career Counseling below).

### Marking Services in Malaysia

Free marking assistance is an initiative and service that has been running in the past in Malaysia, but that was perhaps not that well advertised. A group of local actuaries, all people who have successfully completed their professional examinations, have generously volunteered their time and experience, by offering marking of practice runs of past examination papers.

The idea is that a student would complete a past exam paper under examination conditions, and then send their script, with the memorandum, to one of the markers for their comments and a rating. Anybody who ever sat one of the final examinations would know the importance of presentation and communication of your ideas to the examiners - typically a skill that needs to be refined by most through practising of past papers - and would realize the great value of having a service such as this available.

With the assistance and help from this group of people, we hope to ease the examination process and help put people on the pathway to success much quicker. Anybody interested in using these services can contact [marking@actuaries.org.my](mailto:marking@actuaries.org.my) for more information.

### Career Counseling

"How do I balance work and studies without becoming a complete stranger to the outside world?" "I enjoy my job in investment management and learn a lot from it, but always wondered what it would be like to model the claims on a motor-

portfolio. Where can I find out more about a career in general insurance?" "Is it essential to specialise in one field, and at what stage of my career should I consider doing so?"

Perhaps these, and similar questions are things that you may be pondering on from time to time or perhaps you're just experiencing a series of unfortunate events with a particular exam. As part of our support to students, we would like to introduce a career guidance service, to help deal with these "matters-of-the-heart", by giving the opportunity to speak (confidentially if required) with a professional person working in the actuarial field in the industry.

If questions as the above have been depriving you of sleep, send an e-mail to [counselling@actuaries.org.my](mailto:counselling@actuaries.org.my), and we would try to get you into touch with somebody who can assist with answers. Please don't forget to quote your ASM-membership number and preferred contact details.

Please note that this is not a service for prospective students looking for information on the actuarial career. For such people, we will be releasing a document with web references and a description of the typical education pathway of an actuary on the ASM-website soon.

### UK Education System - Work-based Skills

This section is written especially for students of the Institute / Faculty of Actuaries and employers of such students. With effect from 2005, the Institute / Faculty of Actuaries included Work-based Skills (WBS) as part of the process and requirements towards

## Education newsletter

⇒ qualification.

### To whom does it apply?

WBS is applicable to all students joining the Institute / Faculty from 30 June 2004 onwards. For those exempted from it, it may be important to familiarise yourself with this as well, as you may be required to act as supervisor for students.

### What does it entail?

In short, WBS addresses the practical aspects of a student's training. The WBS-process requires students to answer a series of review questions, based on experience gained through employment that will show the acquisition of skills in each of 7 key dimensions listed hereunder:

- technical application of actuarial skills
- judgement
- professional and ethical
- communication
- commercial
- information communications technology
- management

Each of these dimensions covers a map of skills and experiences of which details are available from the website. As an example, the map of skills for the technical application includes things like data validation and analyses, model building, interpretation of results from a model, application of actuarial principles to solve defined and routine problems, and performance of checks on work.

Employers are allowed to expand on the detail-map, as long as the connection with the key dimension is maintained.

There isn't too much restriction on which questions need to be answered, with the only requirement being that at least one question from each of the 7

dimensions will be covered.

### How many questions, and how much time is allowed?

To show that the process has been followed, a student working towards fellowship needs to answer 12 review questions, which will be made available by the Institute / Faculty, and updated on a regular basis.

The time period for the acquisition of WBS is set to be 3 years. Students need to complete two questions over a 6-month cycle, resulting in completion of the required 12 questions within a 3 year period.

### The role of supervisors / employers

The role of employers in this process is firstly to ensure that students get the opportunity to experience a wide range of skills through their employment. The Institute / Faculty recognise that this has additional cost implications (training courses, discussion time between students and supervisors etc.), but strongly encourage and request employers for their participation in this process, with the aim to develop students to perform their future job as actuaries well.

Supervisors are further required to assist with planning of a student's WBS-programme to ensure each of the 7 key dimensions is addressed over a period of 3 years. Supervisors also need to sign-off on the completed review questions, and must be registered by students (a registration form is available from the website).

The supervisor will be the person responsible for the development of the student during their learning period, typically the same person who is responsible for carrying out the employer's own internal appraisals. Non-

actuarial managers and more experienced actuarial students can act as the supervisor, but in such cases the final supervisor who signs off of the learning log must be a Fellow of an IAA who is familiar with the student's work and progress.

The supervisor will be expected to meet with the student regularly (and normally at least once every six months) to review the progress made, discuss review questions answered, and decide on the skills that will be addressed during the next period.

### More details

For a complete description of the process, it is recommended that you visit the Institute / Faculty website. It contains notes, as well as examples of completed review and sign-off forms, and a set of FAQs. Please visit [http://www.actuaries.org.uk/Display\\_Page.cgi?url=/students/wbs.html](http://www.actuaries.org.uk/Display_Page.cgi?url=/students/wbs.html) for more information.

### Important Reminders

Please don't forget the CA2 Modelling Module workshop that will be hosted in Singapore in August. This is an important part of training requirements, and while being hosted so close to home, the perfect opportunity to complete this section of your education.

Best regards  
The Education Sub-Committee

# Australian Education Path

by Kelvin Hii

**P**rospective actuarial students may face some problems as they consider the possibility of them pursuing a career as an actuary. The most common problem faced is NOT the lack of information around to assist them. Usually the most common problem is that there are so much information and facts everywhere - one may not know where to start looking and may face difficulties to filter out the more important details.

Some people are fortunate enough to know someone who they can talk to and ask questions. Some may not have someone who they can talk to and this is where ASM comes in.

The Actuarial Society of Malaysia (ASM) understands that there are members of the public who are interested to know more about the education system / path to become a fully qualified actuary.

The ASM is keen to assist the public to find out more and promote the actuarial profession to the future generation of actuaries.

## PURPOSE OF ARTICLE

This short article attempts to provide an easy-to-read “starting point” for prospective actuarial students who are keen to know more about qualifying through the Institute of Actuaries of Australia (IAAust) and/ or taking up a course through an Australian university.

There are three objectives to this short article.

- (1) To provide a brief summary of important facts.
- (2) To provide useful and important links/references for further reading
- (3) The author's personal opinions, which does not necessarily reflect those of ASM.

## PROFESSIONAL QUALIFICATIONS THROUGH THE INSTITUTE OF ACTUARIES OF AUSTRALIA

Once a student completes or gains exemptions from all Part I and Part II subjects of the Institute of Actuaries of Australia's education program, he/she can qualify as an Associate of the Institute of Actuaries of Australia (AIAA).

Once a student completes or gains exemptions from all Part I, II and III subjects of the Institute of Actuaries of Australia's education program AND satisfies the practical experience requirement AND completes the professionalism course, he/she can qualify as a Fellow of the Institute of Actuaries of Australia (FIAA).

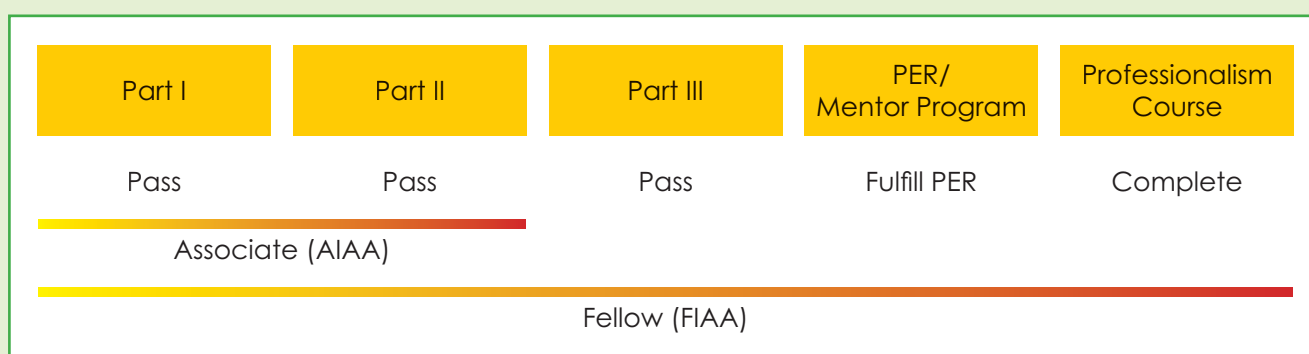
**PART I** consists of 8 subjects (CT1, CT2, ... , CT8). These subjects are the basic building blocks for the later stages and cover various disciplines such as mathematics, finance, economics and probability & statistics.

The Institute of Actuaries of Australia does not teach Part I subjects, and builds its syllabus according to the Institute of Actuaries (IoA)'s Core Technical (CT) Papers. There are three ways of gaining exemptions from the Part I subjects.

### A. Through an Accredited Australian University

Currently, there are four accredited Australian universities – The Australian National University, Macquarie University, The University of Melbourne, and The University of New South Wales.

By enrolling in specific courses/subjects and achieving a certain standard of performance in these subjects, students may gain exemptions from some/all of the Part I subjects. Each university has their own standards and guidelines on how to gain these exemptions. You can refer to the respective universities' websites to find out more.



Disclaimer: The author attempts to provide a brief summary of important facts from the IAAust's Education Handbook 2006. This article acts as a useful and brief starting point and not as a substitute for the handbook. The author recommends reading the handbook for complete and correct interpretation of facts. The author will not be held responsible for any consequences that result from reading this article by itself.



## Australian Education Path

⇒ Australian National University: [http://info.anu.edu.au/StudyAt/101PP\\_Undergraduate/\\_AOI\\_Actuarial\\_Studies.asp](http://info.anu.edu.au/StudyAt/101PP_Undergraduate/_AOI_Actuarial_Studies.asp)

Macquarie University:  
<http://www.acst.mq.edu.au/>

University of Melbourne:  
<http://econ.unimelb.edu.au/actwww/home.html>

University of NSW:  
<http://actuary.web.unsw.edu.au/>

### B. Through the U.K. Institute – Institute of Actuaries (IoA)

To be able to enrol in IoA's Part I examinations, the candidate must (i) be a fully paid member of the Institute of Actuaries of Australia and (ii) complete the UK examination application form from the Institute of Actuaries of Australia's website. Candidates from IAAust must NOT apply directly to the IoA for examination entry. Students must be aware of the fact that they are not permitted to attempt any of the Core Technical subjects more than four times.

Kindly refer to Institute of Actuaries of Australia's website for further details about completing Part I through the UK Institute,

<http://www.actuaries.asn.au/Education/Courses/PartOne>

### C. Through an Non-Accredited University

After completing a related course/subject at a non-accredited university in Australia and New Zealand, one may write to the Institute's Exemptions Committee to apply for exemptions for subjects CT2, CT3, CT7 and/or CT8 only. Please refer to the Institute's website for further details.

<http://www.actuaries.asn.au/Education/Courses/PartOne>

**PART II** is called the Actuarial Control Cycle, and acts as a 'bridge' between Part I subjects and Part III subjects. Part II covers a whole range of issues faced in the business and financial environment such as professionalism, regulation, risks, capital, liabilities, solvency, profit, and investment; and applies this concept – "the Control Cycle" in many situations. This is a very practical program that attempts to teach the student on how to apply actuarial skills (such as those learnt through Part I subjects) to business situations.

IAAust does not teach the Part II subject. However, the student can enrol for this subject through either one of the four accredited universities. Of these, only the University of Melbourne and Macquarie University offers distance education for Part II subjects.

<http://www.actuaries.asn.au/Education/Courses/PartTwo>

**PART III** assumes knowledge of Part I and Part II subjects, and can be divided into four modules (Module I, II, III & IV). Module I (Investments) and Module IV (Commercial Actuarial Practice)

are compulsory for all students. Module II and III will be the area of specialization where the student can only choose one from the following: Life Insurance, General Insurance, Superannuation & Planned Savings, and Investment Management & Finance. For example, if a student decides to specialize in Life Insurance, that student will have to take subjects Life Insurance Part A & Life Insurance Part B as Module II and Module III.

IAAust specifically teaches part III subjects. All enrolment, assignments and exams are to be dealt directly with the Institute of Actuaries of Australia.

<http://www.actuaries.asn.au/Education/Courses/PartThree>

### PRACTICAL EXPERIENCE REQUIRED (PER) / MENTOR PROGRAM

Before a student can attend the Professionalism Course, that student must have at least 'one year' of 'Practical Experience', making use of the student's knowledge/skill in actuarial science. The student can begin counting his/her 'Practical experience from the date that the student sat for his/her last Part II exams.

The student must register for the Mentor program at the start of the student's Part III studies if the student is involved in 'actuarial work'. The mentor is required to sign the registration form and sign off the PER form. The mentor will also act as a guide for the student in providing advice and sharing his/her experience and knowledge. The student's role is to find a mentor, to initiate the first meeting, meet up with the mentor on a regular basis and record down his/her practical experience and a log of meetings and discussions with the mentor.

For more information, please go to the link below:

<http://www.actuaries.asn.au/NR/rdonlyres/46FC7E46-2D92-40EC-A636-FD53514F219B/643/ThePERandMentorProgram.pdf>

### PROFESSIONALISM COURSE

After completing Part I, II and III; and satisfying the Practical Experience Requirement, students must attend a recognized Professionalism Course in order to qualify as a FIAA.

The Institute of Actuaries of Australia's Professionalism Course is a two-day residential course that is held twice a year. This course attempts to help its participants reflect on their responsibilities, as they become a member of the actuarial profession. This course also focuses on ethics, the Institute's Code of Conduct and its applications to real-life situations.

<http://www.actuaries.asn.au/Education/Courses/Professionalism>

## Australian Education Path

### ⇒ PERSONAL OPINIONS

**Does being an actuary make you more popular and attractive to others?**

As much as actuaries / student actuaries would like to believe that the above statement is true, many would admit that a lot of Malaysians have never heard of the actuarial profession. This is because the actuarial profession is in its budding stage in Malaysia. With the continuing development and promotion of the actuarial profession through ASM and with the future crop of actuaries, one can be sure that the actuarial profession will indeed grow and expand into many other areas where actuarial skills can be widely applied and appreciated.

**A degree in Actuarial Studies/Science**

There are many advantages to taking a degree in actuarial studies in university such as being able to fully concentrate on the exams as a 'full-time student' and depending on your academic results – being able to collect exemptions from Part I and/or Part II subjects as a bonus.

**Not having a degree in Actuarial Studies/Science**

This would not be a problem since you don't have to take a course in actuarial studies/science in university to qualify as an actuary. In fact, there are quite a number of actuaries out there that started off with a non-actuarial degree such as information systems, engineering, mathematics and statistics, and have continued to take actuarial examinations until they are fully qualified actuaries.

**Which Accredited University should I enrol in?**

No comment. This is because there are many reasons that one would/should consider such as the location of the universities, the financial requirements, the reputation of the university, the support that the university offers the student, and many more. Different people may have different preferences.

**Is the course / Are the exams difficult?**

This would depend on the student's interest in the subject. If the student is really enthusiastic about the profession, then the student would cherish the learning curve that the actuarial education system demands. In fact, most of the courses offered in universities and professional qualifications are not that easy. Hard work is integral to doing well in your exams/course.

**Are there lots of jobs and will we get paid lots of money?**

Firstly, since actuarial science is such a specialized field, compared to accounting, finance, engineering and others – there are relatively less jobs in Malaysia for actuaries. This may not necessarily be a bad thing as some may prefer to be in a specialized area. After gaining relevant work experience and obtaining full qualification as an actuary through the education system, one can expect to be

remunerated accordingly.

### ADVICE

**Work experience**

- Having the necessary work experience is essential for a proactive learning environment
- Being involved in vacation work will greatly increase the chance of being employed after graduating
- Do not be afraid to start off in a non-actuarial field. Your experience gained there may help you get an actuarial job in the future

**Other skills**

Accumulate skills that can be useful to the actuarial profession, such as

- Programming languages, database systems, computer knowledge
- Firm knowledge of how insurance works
- Being up to date with the financial world
- Not just mathematical skills but keeping a broad mind to the issues that may be relevant to the actuarial profession
- Your character – e.g. team-player, being able to communicate well, easy to get along, pleasant personality, etc.

**Do not be overwhelmed**

If you do decide to take actuarial examinations, do not be overwhelmed. Take things one step at the time. If you are currently in the Part I of the education system, do not be anxious if someone tells you that Part III exams have low passing rates. Concentrate on what you are doing.

**Work hard and enjoy the process**

If you work hard and enjoy the learning process, you will succeed. This applies to any path that you choose, be it actuarial or non-actuarial.

### Reference

IAAust Education handbook:

<http://www.actuaries.asn.au/NR/rdonlyres/49DBF646-0915-4844-9728-29E088A3DFB2/637/2006handbookfinal.pdf>

For any questions, comments, feedback:

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Disclaimer: The section above reflects the author's personal opinions, and does not necessarily reflect the Actuarial Society Malaysia's opinions, or the opinions of the ASM Newsletter team / Communications Committee.

# Sudoku Challenge

		9				8		
6		8			3			4
	1		9		8			5
7		1						8
	4			8			2	
						5		3
8			2		9		4	
4			1					6
						2		

There's only one rule to completing a sudoku: each 3 x 3 box, as well as each row and each column, must contain all the numbers 1 to 9. While the rules of this logic puzzle may be simple, there are numerous strategies to help you solve it.

## Solution

		6				8		
9		8			3			4
	1		9		8			5
7		1						8
	4			8			2	
						5		3
8			2		9		4	
4			1					6
						2		