INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2015

Subject CA1 – Actuarial Risk Management

Paper Two

Introduction

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

F Layton
Chairman of the Board of Examiners
December 2015

A. General comments on the *aims of this subject and how it is marked*

1. The aim of the Actuarial Risk Management subject is that upon successful completion, the candidate should understand strategic concepts in the management of the business activities of financial institutions and programmes, including the processes for management of the various types of risk faced, and be able to analyse the issues and formulate, justify and present plausible and appropriate solutions to business problems.

2. This subject examines applications in practical situation of the core actuarial techniques and concepts. To perform well in this subject requires good general business awareness and the ability to use common sense in the situations posed, as much as learning the content of the core reading. The candidates who perform best learn, understand and apply the principles rather than memorising the core reading.

3. The examiners set questions that look for candidates to apply the principles specific to the situation set out in the questions, having read the question carefully. Many candidates gain few marks by writing around the subject matter of the question in a more general fashion. Detailed specialist knowledge is not required and nor is very detailed development of particular points.

4. Good candidates demonstrate that they have used the planning time well to understand the breadth of the question and to structure their answer – this is a big advantage in making points clearly and without repetition. This also enables candidates to use the later parts of questions to generate ideas for answers to the earlier parts.

5. Time management is important so that candidates give answers to all questions that are roughly proportionate to the number of marks available.

6. The comments that follow the questions concentrate on areas where candidates could have improved their performance. Candidates approaching the subject for the first time are advised to use these points to aid their revision.

B. General comments on *student performance in this diet of the examination*

1. As per previous sessions the candidates who were well prepared and structured their answers scored well on the questions.

2. Those candidates that did not think widely enough on the application type questions did not score sufficient marks to pass the exam.

3. Some of the questions were answered in a bookwork style – this shows that the candidate has reasonable knowledge of the course, but because this exam tests application, candidates need to ensure that their answers are relevant to the question being asked.

4. There were some questions that did test bookwork and some candidates did not seem to have the depth of knowledge to score well on these questions and therefore demonstrate knowledge of the whole course.

5. It is also worth noting that this exam assumes knowledge of previous courses and can ask for relevant mathematical calculations to be made. Therefore candidates should assume that a calculator may be required.

C. Comparative pass rates for the past 3 years for this diet of examination

Year	*%*
September 2015	43
April 2015	44
September 2014	50
April 2014	41
September 2013	49
April 2013	44

Reasons for any significant change in pass rates in current diet to those in the past:

The pass rate for this examination diet is slightly lower than the April 2015 rate, but not materially different. Variation in the pass rate between sessions is expected as different cohorts of students sit the examination.

Solutions

Q1 (i) More claims will be rejected under the new product than under the existing one.

Hence, policyholders who were expecting their claims to be met, may feel unfairly treated if those claims are rejected.

The new product may be marketed as a cheap "simple (no frills)" alternative. That is, creating the impression of being similar to the existing product in its main features. In practice there may be material differences e.g. in terms of illnesses covered.

Policyholders may perhaps accept a lower level of benefits as a quid pro quo but they may not fully appreciate that the lower premiums will need to mean fewer claims being paid.

This will be especially true for existing policyholders who are used to the current payment regime.

It will also be relevant if, in the past, the insurance company has emphasised its attitude to paying claims as a positive.

That is past practice and communication may have given policyholders misapprehensions about the new product.
The new payment terms may not have been clearly stated or advertised. In particular if an intermediary is involved.

Or they may have been set out in an overly complex or obscure way (lots of small print) which, policyholders may not be able to understand.

If policyholders of the new product are aware of policyholders of the existing product whose similar claims have been paid whilst theirs' are rejected, grievances will arise.

In any event, keeping the existing product, will mean two different payment regimes which, may be hard to justify.

(ii) They could market test the new product to assess whether the new terms are clear enough.

Alternatively, they could put a lot of effort and resources into advertising and communications to leave policyholders in no doubt – maybe clear with the Regulator.

They could have independent medical assessors (paid for by the insurance company) who would judge whether particular claims should be paid.

Part (i)	This part of the question was well answered with most candidates scoring well.
Part (ii)	Most candidates came up with one action for this part of the question with better candidates coming up with two distinct actions.

Q2 Premium rates quoted by advisors will fall – net of commission.

However, customers will have to add on the fee to determine the total they must pay. This could be confusing and potentially misleading as it will create customer uncertainty. In particular, it will make comparisons between direct and intermediary sales harder.

This may lead to customers switching between sales media in an attempt to get a cheaper option – but not realising the full implications and so failing.

Premiums charged under direct sales will probably change but overall not by much.

This is because the direct sales force will now be paid as other staff are. That is via salary and bonuses and not via commission.

Hence the expense loadings will be different as allocations will change.

This could see changes between and within classes (by type of policy) but with the overall premium levels being similar.

Commissions are usually charged as a percentage of premiums.

Fees will be related to actual costs incurred and work done.

Hence net premium plus fee maybe more or less than the previous premium.

In particular, there will be less difference between fees on smaller and larger policies than between commission payments – fixed cost issues – making smaller policies relatively more expensive.

Hence, there is likely to be a particular problem where premiums are low and where it is no longer financially worthwhile advisors targeting sales at this segment of the market as the fee would be too high to be afforded by customers.

Hence there could be less cross-subsidy from large to small policies.

One of the key issues is that if commission has driven advisors to sell particular products, then those products will be sales driven, rather than driven by the policyholder demand.

It is likely that commission driven products' sales will reduce significantly in volume as agents/advisors will now have to justify their fees/salary.

Regular monthly premium policies will present significant issues as policyholders will not be used to paying a substantial fee relative to the regular premium at outset.

The alternative to one large initial fee is a smaller fee with each premium (or stepped fees).

This will be unclear, confusing and cause practical difficulties in ensuring fees are paid (lapses).

Average premiums per policy for advisor driven sales are likely to increase as advisors target higher net worth customers that are financially worthwhile servicing (can afford fees).

Overall premium income is likely to reduce unless an increase in higher premium policies offsets a reduction of low premium policies.

This may mean that overall premiums have to rise due to fixed cost issues.

If an insurance company targets lower net worth customers they are most likely to see a significant new business reduction.

If they target high net worth customers then they are likely to experience greater competition as insurance companies move to target business that is financially viable for agents/advisors to sell.

Such competition could reduce overall profitability – all chasing a smaller market.

This question was poorly answered. Few candidates understood the difference between selling via 3rd party advisors and direct sales staff and how this could be remunerated (e.g. commission versus salary) and therefore gave answers that were incorrect. The question was worth 10 marks and very few candidates made enough points to score well on this question. Those that did had well planned out and structured answers.

Q3 (i) Individual risk events should be independent of each other.

The probability of the event should be relatively small.

In other words, an event that is nearly certain to occur is not conducive to insurance

On the face of it, death is certain, so a whole life assurance does not fit within the above criterion.

However the considerable uncertainty over timing still gives rise to an insurable event.

Large numbers of potentially similar risks should be pooled in order to reduce the variance and hence achieve more certainty.

There should be an ultimate limit on the liability undertaken by the insurer.

Moral hazards should be eliminated as far as possible because these are difficult to quantify.

There should be sufficient existing statistical data/information to enable the insurer to estimate the extent of the risk and its likelihood of occurrence.

(ii) The reason for the declined claims needs to be understood.

Claims could be declined due to:

Non-disclosure of information especially medical at the initial underwriting stage.

Not meeting the claim event definition e.g. being covered by an exclusion such as suicide (hazardous activities).

Fraud e.g. a death hasn't actually occurred. In some cases, deaths may be reported to have taken place overseas with weak supporting evidence.

Other crime e.g. someone being killed for the insurance proceeds.

It will be important to clarify what is meant by fraud.

Presumably deliberately lying on an application is but making a genuine mistake isn't?

Also, it will be necessary to check whether exclusions will be allowed and if so, to what extent.

It may be necessary to adopt clear rules to determine which claims to challenge.

Expenses may reduce where it is no longer worthwhile challenging whether the claim is valid.

However, if challenges do go ahead, expenses may increase as more work will be needed to justify rejection.

For deaths that are clear-cut (probably most claims) there will be little impact on the number of claims being paid.

It will become harder to decline claims unless it is clear that the claim definition has not been met (exclusions etc.) or fraud is easy to prove.

This is because the onus will have moved on to the insurance company to prove that the applicant had deliberately non-disclosed to a standard that demonstrates fraud.

Hence more claims being paid which will cause an increase in overall claims costs.

Where there is reinsurance then the direct insurer is likely to have to pay more claims where the reinsurer does not pay, further increasing the cost of claims.

(iii) The main issue will be poor (i.e. undisclosed) information that will mean more claims being paid than would have been assumed.

Hence:

Increase the quality of underwriting at outset. That is, get as much information as possible.

Good sources that are less likely to be vague e.g. doctors' reports will help.

Revise policy wording so the claims criteria are significantly clearer. That is, in line with the spirit and interpretation of the new regulation e.g. on exclusions.

Lots of warnings about consequences of non-disclosure may encourage better information.

Negotiate reinsurance terms so that there is full alignment between the insurer and reinsurer so that there are fewer cases where the reinsurer rejects claims.

Increase new business premiums due to more expected claims and general uncertainty over the impact.

In extremis, the insurance company may decide to withdraw from the market.

It may be necessary to have more premium bands or reject more applications to counter increased risks.

Part (i)	This part of the question was answered well, with most picking up the bookwork marks on offer.
Part (ii)	This was answered satisfactorily with most candidates scoring some marks, better candidates went into more detail in their answers.
Part (iii)	This was answered reasonably well, with most picking up the easy actions that could be taken, better candidates thought more widely on the possible actions specific to term assurance.

Q4 (i) The main reason will be to ensure that the claim is valid.

Both in terms of the peril being covered (e.g. if 3rd party liability only is the event insured) and the claim amount being commensurate with the loss/costs incurred i.e. not inflated.

In particular, that the claim is in accordance with the policy's terms and conditions e.g. not subject to an exclusion.

The aim being to ensure that the amount paid (or 0) is correct (not too much) e.g. to eliminate fraudulent claims.

Investigation of a representative sample of claims will help the insurance company better understand the risk profile and so aid pricing and underwriting.

It may help in setting terms and conditions e.g. for new developments (technology) or types of claims – risk profile changing.

It may help in providing advice to the insured on how to avoid (or reduce) claims – safety and security issues. Or indeed to manufacturers on design issues.

(ii) The main criterion would be the amount of the claim.

Either actual claim amount or in some cases (e.g. liability) the estimated potential claim amount.

Large claims e.g. over a threshold would be investigated.

The rationale being that the potential savings on investigating small claims wouldn't compensate for the expense, time or hassle involved.

The amount could be a fixed cash value or may be relative to average claim amounts.

Allowance would be needed for inflation of claims cost i.e. the threshold may change over time.

The threshold may vary by type of claim or other rating factor e.g. location or if certain suspicious signs were present – see (iii).

(iii) Claims will arise from incidents that are the fault of the criminals but are made to look like the fault of the insured drivers.

Hence, the insurance company will focus on scenarios where this possible – e.g. incidents involving more than one vehicle or pedestrians.

In particular, claims for injuries that are hard to verify or assess e.g. whiplash and that are not too serious.

It is possible that claims for damages to vehicles could be involved e.g. if garages are providing inflated quotes for repairs etc.

The insurance company will want look for similarities amongst claims involving common factors.

In particular, the features of the incidents will probably be broadly alike e.g. crashes at roundabouts, traffic lights, parking, rear shunts etc.

Locations will tend to be the same both in terms of general areas (e.g. South Manchester) and specific sites e.g. at a few notorious accident black-spots.

Time of day could be a relevant feature e.g. in rush-hours.

The same vehicles could be involved (if not damage claims), with possibly the same claimants or, more likely, registered owners or maybe addresses of claimants/owners.

The information provided on the claim form will be a useful source.

Again it is likely that common descriptions or words and phrases will be used.

This will be particularly relevant if claims are coming via a claims management agency and they are preparing the documentation.

Check if the same doctors are verifying injuries and their extent – solicitors may also be involved for the same purpose i.e. quantifying claims.

The behaviour of claimants (as described on claim forms) could be similar e.g. in how they approach the insured and things that they say or do – exaggerated actions trying to emphasise injuries. Look for unusual behaviour repeated in many claims.

Likewise, the same witnesses may be being used making the same comments.

It is likely that drivers who are very likely to be insured (or will not cause a fuss) will be targeted e.g. company car drivers, the elderly or respectable looking.

It likely that individual claims will not be very high i.e. trying to keep below the radar, threshold for investigation.

It is possible that stolen cars may be used.

Hence co-operation with police databases may help.

Likewise, co-operation with other insurance companies may help if they are experiencing similar problems.

Part (i)	This part of the question was reasonably well answered, with most picking up relevant points. However a number of candidates did not state the obvious (e.g. check that the claim was valid) and therefore missed easier marks. Better candidates thought more widely and covered setting terms and conditions.
Part (ii)	This was answered reasonably well, with most candidates identifying amount as key and then elaborated well to score sufficiently.
Part (iii)	Again this was answered reasonably well, but given the question was worth 8 marks, many candidates did not make enough points to score all the marks available to this part.

Q5 (i) (a) Amount $= 100\{(1.03)(1.03) \times 0.99 + 0 \times 0.01\}$
$= 105.03$

(b) Amount $= 100\{(1.01)(1.01) \times 0.10 + (1.02)(1.02) \times 0.20$
$+ (1.03)(1.03) \times 0.30 + (1.04)(1.04) \times 0.25$
$+ (1.05)(1.05) \times 0.15\}$
$= 106.41$

(c) Amount $= 100(1.50) \times (1.50)$
$= 225.00$

(ii) Amount if invested in government bonds $= (1.02)(1.02) = 104.04$

(a) The guaranteed return implies a fixed 2 year term (if not, unknown price).

It also implies no income (or guaranteed reinvestment rates).

Due to unknown reinvestment rates (probably).

The relatively low return above government implies relative security.

The default risk implies a corporate issuer.

Likely assets are commercial loans or paper from a highly rated entity.

(b) A positive return doesn't necessarily mean price rises. A relatively high income yield could go together with price falls.

Given likely yields, there is a chance of noticeable price falls.

Estimated returns (and probabilities) imply uncertainty.

A range of outcomes implies volatility of price (yield more stable).

But the range is relatively narrow.

This implies a degree of diversity within the investment.

Or could argue for relatively "stable" risky assets e.g. defensive equities.

Likewise no total default risk implies the same.

Given the relatively high return v a. and government, assets are expected to be relatively risky.

The most likely assets are a portfolio of equities.

Though a case could be made for portfolios of long (**not** short) bonds or property.

(c) In general, if things look too good to be true then something is wrong.

The certain guaranteed return is totally unrealistic relative to other available returns.

Hence it could be an illegal venture e.g. a pyramid scheme.

More likely, assets don't exist i.e. have been embezzled, a con.

(iii) (a) Someone relatively risk averse who is looking for preservation of capital (e.g. uncertain short term outgo).

For example someone saving for a short term liability or project (e.g. big holiday) or a retirement lump sum (NOT pension).

(b) Someone less risk averse or with no specific liabilities (or who has free capital).

Perhaps a younger person saving for retirement or looking for relatively high real (but not very high risk) returns.

(c) The gullible or stupid or greedy (or all 3).

Part (i)	This question was reasonably well answered. However a number of candidates struggled with this question, and some candidates gave the correct formula but did not calculate the final result – maybe due to not having a calculator.
Part (ii)	This question was answered reasonably well, but some candidates failed to comment on the likelihood of the returns from investment C.
Part (iii)	This had mixed responses, those candidates that analysed the investment opportunities and considered the characteristics of each investment scored well.

Q6 (i) Future investment returns.

Future salary levels

Future inflation rate in order to determine the assumption to be used for benefit increases

Mortality (either for members or other beneficiaries):
Before retirement
After retirement

For example:
Of those taking ill health retirement; or
Of early leavers

Improvements (future changes) in mortality

Probability of leaving or entering employment

Probability of retirement due to ill health

Marital/family status or proportions with dependants (e.g. partners or children).

(ii) In determining an assumption for future investment returns, historical data on dividend yields on equities and on the total returns on other asset classes held will be useful.

Historical data can fluctuate significantly and it may be thought that only data relating to a period after a significant change can be used (i.e. relatively recent).

Earlier data will be needed to try to strip out the fluctuations that relate to economic and fiscal conditions. So need a reasonable volume (history).

This will also be relevant since a long term view of future returns is needed.

Historical data on salary levels in the country, industry and organisation will be useful when making an assumption about future levels of salary growth.

It is important to ensure that this data is relevant to the individuals in the scheme.

It may be necessary to make an adjustment to the historical data to allow for differences in the characteristics of the individuals concerned (e.g. changes in the workforce/organisation).

The scheme sponsor may be able to provide information on planned future salary increases or if method of is changing e.g. higher proportion via bonuses

Historical levels of an index to measure inflation are likely to fluctuate significantly.

They are unlikely to be very useful in determining an assumption for future levels of inflation. For example long periods of relatively high or low inflation.

Current index levels are likely to be a better guide to future levels of inflation.

Government projections and the "risk free" real returns indicated by the current yields on long-term index-linked bonds could be used e.g. yield gap v conventional bonds.

It will be important to use an index that relates to how benefits (in deferment and payment) actually increase e.g. RPI or CPI.

There may be data available on historic levels of mortality in the country, e.g. general population mortality.

There will also be insurance company and general pension scheme data which, may be more useful (selection by employees joining the scheme).

There may have been recent investigations of scheme mortality.

Separate rates will be needed for rates in service, after normal retirement, after ill health retirement and for early leavers.

There may be less scheme or organisation data for ill-health or deferred mortality.

The data will need to be relevant to the individuals in the scheme and adjustments may be needed to allow for this (e.g. if not from scheme sources).

This may be particularly relevant if the organisation is non-standard and hence has "unique" mortality features.

The historical data can be used to project future improvements in mortality.

Mortality data is mainly affected by medical advances and historical data should be considered with this in mind.

This is likely to result in significant emphasis being placed the most recent data with consideration of past trends and their underlying reasons being important in determining the extent of future change.

Historical scheme data e.g. experience investigations can also be used when determining the probability of individuals leaving employment or becoming ill. But it may be volatile or out of date. *Non scheme data is probably of less use here.*

The organisation may be able to provide information on likely future rates of withdrawal e.g. if they have significant changes in mind (could be confidential).

They may also have information on how ill health retirement rates relating to the scheme may change e.g. changes in work practices and the business or how the definition in the rules is applied.

Historical country, industry and scheme data on proportions married or with dependants may not be of much use.

Cost will depend on the circumstances when benefits become payable.

For example married at death, leaving or retirement.

Common law marriages or same sex relationships may give rise to benefits in the future.

(iii) Increasing retirement age.

Reducing accrual rate.

Bringing in (or increasing) minimum level of service e.g. a waiting period before eligibility for benefits begins.

Increasing employees' contributions.

Reducing pensionable salaries or pensionable salary increases e.g. only basic pay or RPI increases.

Changing from final salary to career average salary.

Reducing death benefit.

Maximum annual pension per individual (e.g. via a service or salary cap).

Reducing increases to pensions in payment and/or deferment – if allowed.

Reducing the level of dependants benefits or limiting circumstances where payable (e.g. only on ill health).

Reducing ill health benefits e.g. pay only a deferred pension (maybe from say 55).

Tighten eligibility for ill health pension (e.g. only work related issues, no pre-existing conditions).

Reducing early leaver benefits e.g. enhanced transfer terms.

Cutting down on the potential value of options or guarantees e.g. commutation rates

Part (i)	This question was answered well with most candidate covering all the relevant assumptions.
Part (ii)	This question was generally poorly answered. Those that structured their answers did well, focusing on more than one or two assumptions covered in part (i).
Part (iii)	Some good answers here with the best answers considering a number of actions rather than just focusing on one or two possible actions.

Q7 (i) **Employer**

Injury or accident to employees at work e.g. sorting machinery or related.

Issues to do with delivery routes e.g. claims relating to heavy loads, faulty equipment e.g. vehicles.

Claims relating to workloads e.g. too excessive or stressful (time deadlines).

Claims relating to dangerous practices (negligence) e.g. being sent into dangerous areas, lack of protective clothing (against weather or visibility).

Public

Lost, stolen or damaged letters or parcels – could be very valuable.

Injury or accident to members of the public e.g. from vehicles.

Damage to property caused in delivery e.g. trampling gardens etc.

Injury to the public whilst on company property e.g. whilst collecting things.

(ii) In general profits will be adversely affected.

Prices may be set with regard to political rather than profit criteria.

For example kept low to boost popularity of government.

Alternatively prices may be set high as a form of tax.

In this case profits would still suffer as the government would take the excess for itself.

In any event, the government won't have the expertise to set "correct" prices. As above, this implies low profits or clawback of excesses.

The government postal service may give input as they will have expertise – but this could be ignored.

Competitors can and will cherry pick. That is they can choose not to deliver to certain addresses

They will deliver on low cost routes and ignore high cost ones (e.g. urban v rural).

They can undercut the government service on price on low cost routes.

Hence the government service will be left with high cost routes and the same price for all routes means losses on those routes.

Competitors will have lower admin costs as they will be selective needing lower overheads.

Compliance with regulation implies more costs for the government service.

Essentially, competition takes the profitable services.

(iii) (a) **Beneficial**

More on-line shopping implies more need for delivery of purchased goods.

(b) **Detrimental**

More e-mail communication implies fewer letters.

(iv) A clear definition of the aim of the project.

Full planning.

Thorough risk analysis.

Monitoring of development.

Measurement of performance and quality standards.

Thorough testing at all stages.

Care in managing different strands of the project (critical path analysis).

Move along at the appropriate pace.

Stable but challenging relationships with suppliers.

A supportive environment.
Excellent communications between those involved.

Positive conflict management.

A schedule of what needs to be considered at each milestone review point.

Strong experienced leaders.

(v) Installation of the system could cost too much (over budget).

Staff (especially skilled) costs or equipment costs higher than expected.

The system may take too long to install. For example due to planning or infrastructure issues or unforeseen complications.

This will increase costs.

It will also lead to inefficiencies and work disruption.

In particular there will be transitional problems.

Periods will exist when 2 (or 0) systems will be in place together – making work difficult.

Data could be lost or corrupted during transition.

The main issue could be that the system doesn't work properly (e.g. poorly installed).

Causing major disruption to the business.

It may be difficult to integrate within and/or between the retail and delivery sides of the business or other users.

It is possible that attempting a cheap install will lead to faults later on.

Staff may be poorly trained, lack expertise or support and so are unable to use the system.

Particularly relevant if highly sophisticated means complex.

This could affect staff morale and so further worsen performance.

The new system is used by different types of organisations.

Hence it may be incompatible with the postal service's needs.

In particular the postal service is primarily retail based. There will be some complications where the service acts as an agent e.g. benefit or bill payments. But generally accounting will be about reconciling revenue to sales.

Life insurers are involved in managing customer policies and accounts – in particular linking benefits to premiums. Record keeping and updating will be more complex than for a retailer.

The need to calculate reserves and value assets will add further complications.

Hence the new system is likely to contain a lot of expensive features and functions not required by a retailer.

Any problems could cause political problems for the government.

Part (i)	This question was generally answered well but some candidates had little knowledge of the two products mentioned.
Part (ii)	This question was also generally well answered, with most candidates scoring reasonably well. The better candidates were able to expand on the points being made.
Part (iii)	This was answered OK, but some candidates needed to focus on the postal delivery company rather than giving general answers.
Part (iv)	Generally well answered, with most candidates picking up the requirements of project management.
Part (v)	This part was not answered very well. Candidates generally picked one or two ideas and went into significant depth on these, which scored well but did not give the range of answers required to score the marks available for this part.

END OF EXAMINERS' REPORT