

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2013 Examinations

Subject CA1 – Actuarial Risk Management

Paper One

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.

D C Bowie
Chairman of the Board of Examiners

January 2014

General comments on Subject CA1

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.

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.

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.

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

Comments on the September 2013 papers

The general performance was slightly higher than in April 2013. Question 4 on paper 1 and question 2 on paper 2 were on average less well answered.

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.

1 The internal rate of return is the interest rate that gives a project an NPV of zero and a higher IRR means a greater return/profitability from the project

To calculate the IRR, will need the most likely cashflows for capital expenditure, running costs, revenues and termination costs. For some projects it may be difficult to estimate these costs.

If the IRR of a project is higher than a predetermined hurdle rate then the project may be suitable. The company’s approach does not consider this hurdle rate so it is possible that none of the projects is suitable.

The IRR approach may lead to more than one solution. This is a particular problem when there are negative cashflows involved. This may be significant for projects with termination expenses.

It takes no account of the size of the profit involved so the approach could lead to a small profitable project being chosen rather than a larger project with a slightly smaller IRR. Lots of small projects could be more costly and reduce returns.

It doesn’t allow for the risk involved in a project so the method could lead to the more risky project being taken on (if this was the reason for the higher IRR).

It assumes that the single rate is suitable over the whole term of a project and that any income can be reinvested at the IRR. This may be unrealistic especially for longer projects.

IRR does not include any information around when profits are actually obtained

Comparing net present values of the project may be a more suitable approach.

This method takes account of the size of the potential profit and the project with the highest NPV would be favoured. The discount rates used can be adjusted to allow for the risk of each project and can also vary by duration if necessary.

The payback or discounted payback period could also be calculated. A payback period that is less than a predetermined period set by the sponsor would be considered suitable; the lower the period the better.

The IRR method is, however, relatively simple and easy to understand. It does not involve a decision to determine a suitable discount rate and it could be suitable for comparing less complex projects.

The financial results cannot be considered in isolation. A subjective assessment will also be needed to ascertain whether the projects being assessed:

- achieve synergy/compatibility with other projects, or diversification
- satisfy any political constraints / other stakeholders
- have sufficient upside potential
- does the company have enough cash/capital in the first place

The risk profile over the lifetime of the contract also needs to be considered along with the actual cashflow profile

Most candidates scored reasonably well on the bookwork but struggled on the risk aspects and the wider issues around project selection.

- 2** Long-term care insurance is used to help provide financial security against the risk of needing either home or nursing-home care as an elderly person, i.e. post-retirement. The contract could pay for all the costs of care throughout the remainder of life (an indemnity contract), or could provide a cash lump sum, or an annuity, to contribute towards the costs of care.

The level of risk and uncertainty depends on the nature of the benefits.

- (a) The insurance company charges a premium based on the expected cost of the benefits. This may be set a long-time in advance of when the benefits become payable.

This timeframe increases the uncertainty of the experience, e.g. because of investment returns, trends in claim frequencies and amounts.

The insurance company is exposed to the risk that benefits become payable earlier than expected, that the benefits are payable for longer than expected, and that the benefit amounts are higher than expected.

There is also the possibility that deaths are not reported. This may be due to fraud or oversight.

The insurance company manages the claim risk through claims management. It will set criteria for deciding whether a claim becomes payable. The claim management process will involve qualitative assessment of the claim criteria. The insurance company faces the risk that the claims management leads to more claims being accepted than expected and this could lead to liquidity issues for the insurance company.

If the contract pays for all the nursing-home costs or care costs then the policyholder may try and claim at an earlier point because of the insurance.

If the insurance company uses reinsurance then it is exposed to the risk that the reinsurer is unable to fulfil its obligations, or that because of failures in the insurance company's claim management process it will not pay reinsured claims.

There could be legal disputes around what is covered in the contract

- (b) The policyholder is exposed to the risk that the insurance company is insolvent when a claim is made, or becomes insolvent whilst claims continue to be in payment.

The policyholder is exposed to the uncertainty that the policy does not provide sufficient cover when a claim is made, e.g. because cover is too low or not for the full duration of a claim.

or that the policyholder does not meet the criteria to qualify for benefits when expected. OR the benefits might not be in the form that the policyholder requires (e.g. a lump sum might not be what is required)

Where the contract only covers part of the cost of long-term care, then if the policyholder is unable to pay the balance then they may be restricted in the benefits that they are able to claim.

If the insurance company chooses the care provider the policyholder might not get the care they would like

There will also be the risk of increasing premiums, unless these are fixed at outset.

The policyholder may never actually need to claim on the policy

This was a poor question for many candidates; few commented on morbidity, the long term nature of the contract, reinsurance and claims management. The policyholder perspective was better answered.

3 Being a Professional

Need to be reliable – in particular delivering the work that meets the global company's requirements in terms of detail, quality and timeliness

What level of detail does the global company require

Do the timescales/budget look reasonable – when does the global company want the information

Need to recognise other stakeholders and what is in the public interest as well

Need to be competent to do the job and also know their limitations such that they can ask for advice from other professions if required

Know your client

Need to have sufficient background about the global company and in particular each of the business units

Conflicts of Interest

Need to consider if they advise any potential buyers for the business units

It is important that there are different advisors who are independent particularly if they are looking at the same data

Consider whether Chinese walls or other procedures could reduce the possible conflicts and also need to ensure price sensitive information is correctly protected

Also need to consider the incentives for the consultancy – i.e. is commission based on selling the targets, leading to them suggesting the targets that could generate the most revenue for the consultancy

The actuary advising could have grounds for stepping down from sourcing buyers for the worst performing units (massive conflict of interest)

The task

Need to consider how each of the business units will be assessed and how possible buyers will be presented to the global company

What will the implications of the results be and for whom – will this lead to impacts on the customers of the business units and/or job losses

What resources (and ongoing contact with the insurer) are required to assess the business units and finding possible buyers.

What is the problem

How is the consultancy going to compare each of the business units – does it have a clear metrics in which to assess them OR will they need to ask a lot of questions to get to the answer

Is there a particular price required to make a deal work?

Answering the questions

Need to have access to all the relevant facts of the business units (including any future benefits)

When sufficient facts about each of the business units are not available will need to mention to the global company when giving an assessment of each of the business units

Also need to understand who will review the results of the analysis of the business units – will the global companies strategy review the team – and will they also assess the possible buyers

Assumptions/Methodology

Any assumptions/methodology made about the business units will need to be determined and if any metrics that need assumptions to be made will need to be considered

Particularly an assumption around what it is meant by underperforming means and how it will be assessed

Checking the answers

When the business units has been assessed the answers will need to be reviewed to ensure the decisions about poor performing business units looks reasonable.

Will a range of possible business units be offered with differing sensitivity analysis attached

Communication of the answers

Global company needs to understand the recommendations of the poor business units and hence the results need to be clear with assumptions, areas of risk and uncertainty need to be clearly presented

Need to consider any professional guidance and regulation

Ensure that adequate documentation is kept on the work being done

Professional Implications

Need to consider the actuarial quality framework and concerns around bringing the profession into disrepute

The better candidates had clearly thought about some of the big issues in the question and used this as a starting point for their answer. Very few were able to lay out their answers well.

4 (i) Based on historical experience

Using judgment to determine hypothetical events

From the results of a stochastic model (and/or economic capital generator)

Specified by legislation if it exists within a country

(ii) A model can be defined as a cut-down, simplified version of reality that captures the essential features of a problem and aids understanding.

It is a balance between reality (real life) and simplicity (ability to be built and tested)

The purpose of the model is a key factor. If the company wants to model the impact of financial guarantees on one of its products then the model will be quite complex and will need to include stochastic elements. Whereas if the model is to check premiums then a simple spreadsheet model may suffice

If the model is being purchased or built externally (e.g. by consultants) make sure that the model used is fit for the purpose for which it is being used.

The availability of expertise and funding to build and run the model needs to be considered. Experience is required for the initial design but the eventual running is more a case of time and manpower.

There are data issues to consider such as the availability of past data for example claims, premiums and expenses. But also issues with validity, is the data from a trustworthy source and is there enough of it to be credible. The compatibility of the data with company systems and the time periods it comes from also need to be considered

Once the model has been decided and suitable data found then parameters for demographic, investment, expense and product details can be estimated. The parameters must reflect the features of the company and task in hand as well as those of the environment in which it is operating.

The model points used should represent adequately the underlying business. Thus, the output from the model will be a reliable & credible indicator of the likely outcome in practice.

The model needs to allow for all the cash flows that may arise from premiums, expenses and benefits, including those arising from the need to hold supervisory reserves and an adequate margin of solvency. It also needs to allow for the interaction of assets and liabilities and the potential cash flows from any health or other options.

The model should be rigorously tested and adequately documented, to minimise the risk of an undetected error being present or the model not representing the products or business

The results from the model should be capable of independent verification. This provides additional reassurance as to the accuracy and reliability of the advice given.

The results should be readily understood by the model's users and easily communicated. If they are confusing or ambiguous, inappropriate conclusions may be drawn, and may be difficult to review.

Whilst it is important to achieve an acceptable level of accuracy, the model should not become overly complex. Otherwise, it may take too long to run and be too expensive to maintain. The model also needs the balance of being flexible.

Failure to comply with these basic principles will mean that the model may be inappropriate and misleading as a tool in managing the business. An inappropriate model may lead to lower profits or the need for more capital or at worst threaten the solvency position of a life company

This was surprisingly poorly answered. Many candidates simply did not give sufficient detail on part (ii) for the marks available

- 5 (i) ER = Initial income yield
+ Expected capital growth
+ Appreciation of exchange rate of overseas currency over domestic economy

ER = Initial income yield
+ Expected income growth
+ Change in yield
+ Appreciation of exchange rate of overseas currency over domestic economy

- (ii) If assets are fairly priced then we can equate required and expected return

Hence the following formulae will be true:

$GRY = \text{risk free} + \text{inflation risk premium} + \text{expected inflation}$

$\text{Rental yield} + \text{Rental Growth} = \text{rfr} + \text{expected inflation} + \text{Property risk premium}$

$\text{Dividend yield} + \text{dividend growth} = \text{rfr} + \text{expected inflation} + \text{equity risk premium}$

Comparing property versus equity:

$\text{Property risk premium} - \text{equity risk premium} + \text{expected dividend growth} - \text{expected rental growth}$

The gap between the two products in this case is 3%

This could be due to a high property risk premium versus equity risk premium

Or due to low rental growth relative to dividend growth

For the property versus government bond the following needs to be considered:

$\text{Rental yield} - GRY = \text{property risk premium} - \text{inflation risk premium} - \text{expected rental growth}$

Therefore in this case:

$5\% = \text{property risk premium} - \text{inflation risk premium} - \text{expected rental growth}$

For this to be the case the following must hold:

- High property risk premium
- Low inflation risk premium (i.e. low uncertainty)
- Low rental growth

Comparing equity to government bond:

Equity risk premium – inflation risk premium – dividend growth

In this case the gap is 2%

For this to be the case the following must hold:

- Low equity risk premium
- high inflation risk premium (i.e. high uncertainty)
- High dividend growth

Government Bond

- This gives the lowest return and hence is unlikely to be achieving the demands of the investor (i.e. maximising return)
- It is not a real asset and therefore will give no inflation protection
- Does not usually have a capital gain and hence no benefit here either
- However it is the most marketable and hence if the investor needs to sell then it could be better than the other assets

Equity

- Gives a reasonable return compared to the government bond
- Company is global and hence could have good diversification such that the investor is not susceptible to one country's economy
- It could also have good opportunities in the future in terms of capital growth
- It is also a real asset and hence will give some inflation protection

Property

- Gives the highest return of the 3 assets and therefore could be suitable in meeting the investor's aims
- However it is for a local business and could be very bespoke so if the company did badly there might not be other tenants available (that is it might not be very marketable)
- The property may have some opportunity to give some capital returns
- Again this is a real asset and hence will give some inflation protection

The investor needs to consider the duration of the assets because of the need to reinvest if duration is short, or to disinvest if duration is long (or indefinite). The government bond will normally have a defined term, and for the property the question may be the term of the current rental agreement.

Need to consider the tax position of the assets and the investor – i.e. need to consider the net returns

The security of the asset and the possible default risk also have to be considered in looking at the actual return of the asset

- (iii) For an investor wanting to maximise returns in his domestic currency it is also necessary to allow for the expected changes in the exchange rates over the period of the investment.

An overseas market would be considered cheap if:

Expected return in foreign currency + expected depreciation of domestic currency > expected return in domestic currency

The investor therefore should consider investing in the foreign currency if the margin of the LHS over the RHS exceeds the risk margin the investor requires for investing in the foreign country

Investing in overseas cash could give the investor better diversification

The investor needs to consider matching – e.g. if planning to retire overseas

- (iv) What time horizon is the company looking at

What is the purpose of the loan

What do the financials of the company look like – what is the profit, how does the balance sheet look like

Are there other loans and what level of priority does this loan get

Is there any other current funding (e.g. equities)

What does the business do and what industry is it in

Is there any security (asset or director guarantees) for this loan

How risky is the business and the project, and can the risks be mitigated

What impact will the loan have on the businesses financials

How much money does the company want to borrow and how does that compare to its profits and current balance sheet

Who are the directors of the company – what expertise do they have

How long has the company been running – and what is its repayment of similar loans like

What are the company’s plans longer term

Reasonably well answered overall, especially part (iv)

- 6** (i) On Retirement
On Sickness
On Maternity/paternity
Housing deposit
Education costs (for individual or child)
Health costs for dependants
On leaving the company (e.g. redundancy)
On death
Marriage
- (ii) It is relatively easy to understand and administer;
- Employees will have less inflation risk before taking benefit out, as account will grow in line with overall living costs.
- To attract and retain employees: may be offered by other companies in the same industry or it may give the company a competitive advantage if it is more attractive than the benefit offered by competitors.
- There may be tax benefits for the employee and/ or the employer.
- Regulation may require it, or schemes with this feature may be subject to lower level of regulation than some alternatives.
- (iii) The policy will reduce the risk to the company of not being able to meet the guarantee.
- Ideally, the inflation index used for the guarantee should be the same as the index used for the securities.
- It assumes that there will be index linked stocks of the appropriate term.
- The term of liabilities will not be known in advance as the possible events vary significantly in timing.
- There may need to be limits on when/ how often money can be taken out and possibly notice needed.
- There may still be a marketability risk with the index linked securities.
- There is also the possibility of a default if the securities are issued by corporations rather than the government.

- (iv) *This assumes all the employees are domestic. Slight adjustment to overseas category if this is not assumed.*

The following investments could be considered:

Cash on deposit

Cash would give a positive return although this may not keep up with inflation. There may be instant access and this would be very useful for liquidity. So holding some of the fund as cash would be useful and may mean + that there could be more flexibility on holding other securities.

Money markets

These are also very short term instruments and will have similar advantages to holding cash on deposit.

Fixed interest securities

These can be issued by an industrial company, a public body or the government of a country. A lump sum of a specified amount of will be received at a specified future time together with a series of regular level interest payments until redemption. There will be some uncertainty associated with the cashflows due to credit risk particularly for corporate bonds.

These securities will not provide the inflation linked return required but it is possible that some high quality fixed interest stocks of an appropriate term may be held.

Ordinary shares

Shareholders of a company are entitled to a share in the company's profits. Profits are distributed to shareholders as dividends. It is expected that company profits will increase over time and so dividends will also be expected to increase. In the long term, this should lead to increases in share prices in line with increases in company profits. There will, however, be risks associated with individual companies.

Ordinary shares could provide returns in line with inflation and may give higher returns although there is also the risk that the return may be lower. These may be suitable for the long term events (e.g. retirement benefit) but probably not for any shorter term events.

Property

Property is a real asset and would be expected to provide a long term hedge against inflation. It is, however, much less marketable and less secure than index-linked government bonds. It will also be relatively expensive to manage.

Property would be useful to provide diversification but unless the fund was sufficiently large, this is unlikely to be practical.

Overseas bonds/shares/property

Overseas assets provide diversification from the domestic equivalents (if these are decided to be suitable). Overseas assets may give rise to higher returns due to the higher risk involved or due to inefficiencies in the global market. There will, however, be currency risks.

Overseas shares could be useful but additional expertise would be required.

Collective investment schemes

These provide structures for the management of investments on a grouped basis. They provide the opportunity for investors to achieve a wide spread of investments and therefore to lower portfolio risk. Managers of such schemes are likely to have management expertise which is otherwise available only to the largest institutional investors. However there will be additional costs associated with the investment (i.e. the cost of obtaining the expertise)

These schemes are likely to be suitable for overseas and property investment. They may also be suitable for investment in domestic equities.

Derivatives

These may be useful to hedge against changes in prices and currencies and so could be used as part of the overall investment strategy.

It may also be possible to hedge against movements in the inflation index.

- (v) A suitable wide range of investments should lead to higher growth and could give diversification benefits

But need to allow for additional costs.

Over a number of years, there may be considerable savings which could be used for the business if the company has control of any surplus.

There will, however, be increased risk and the investments may not increase in line with inflation.

There may be capital requirements (or the government may introduce them) requiring the company to make additional contributions if a deficit arises.

There may be restrictions on what investments can actually be made

Generally well answered, although in part (iv) many candidates did not write enough about the specifics of the question.

- 7 (i) The government could use taxation revenue (or distribute the revenue differently e.g. taking away funding from other areas)

This would probably mean that taxes would have to rise since the project is huge and so current revenues may not be sufficient.

They could use a general increase in taxes or have targeted taxes that apply for a given period (e.g. focusing on those who will benefit most from the programme).

The government could borrow money.

Given that the project is likely to be medium to long term, the government will probably borrow by issuing bonds.

Although the country has capital markets, these may not have the required capacity and so they may need to target overseas investors.

They may wish to arrange repayments to tie in with proceeds i.e. when the benefits of the programme lead to increased taxation revenue as a result of economic growth.

As a variant, the government could borrow from private citizens.

For example they could set up national savings schemes or a national lottery with funds allocated to the project.

Part of the funding could come from tolls or other charges on likely road users.

However, such funds would not come through until after construction is complete, and so may need to be used in conjunction with other methods – e.g. a source of income to repay loans.

An option could be some form of partnership with the private sector.

In effect, the private sector would be responsible for funding and completing the project. But they would receive fees from the government over a set period as compensation. Such fees could be fixed (maybe inflation linked) or in the form of equity e.g. a share in toll revenues.

Again, there are domestic companies who could be involved but overseas partners with greater expertise may be needed as well.

The government could sell some assets (e.g. gold reserves or privatisation

The government could have access to funding from other parties (e.g. IMF)

(ii) [We ask for one risk per cell – more are given here but only one is needed].

	Planning	Construction	Ongoing
Unpopular	Plans may involve destruction of significant buildings e.g. temples. Some cities or areas may be missed out leading to local troubles.	Outside as opposed to local workers used. Excess noise, pollution or environmental damage.	Roads closed for long periods High tolls for local people.
Costs	Too many expensive consultants may be employed unnecessarily. Particular resources e.g. building materials may be chosen that turn out to be more expensive than the alternatives would have been.	Workers strike for higher wages. Inflation of raw materials prices higher than expected.	Sweetheart deals with favoured contractors. Heavier lorries than expected cause more damage.
Delays	Errors may be made leading to plans having to be redrawn. Local authorities may reject certain proposals or public inquiries have to be set up.	Bad weather or natural disasters. Ground conditions create more work e.g. swampy or rocks too hard or soft	Mismatch of resources e.g. snow ploughs in the wrong place. Poor decision making or cost control means repair work is delayed e.g. no night working allowed

(iii) **Avoid**

Problems with local authorities or planners could be avoided by having central government dictat. That is, no appeals what we say happens with no delays.

Problems with tolls for local residents could be avoided by giving certain groups free access e.g. local businesses or commuters.

Transfer

Wage costs could be transferred to sub-contractors. The government could pay a fixed fee to the contractor and let them negotiate wage rates. Although this won’t deal with delays caused by strikes etc.

Likewise, costs due to bad weather or disasters could be insured. Again there are issues with delays.

Share

Problems with some areas being missed out could be shared by having agreements between all political parties, national and local. In this way, blame is diffused since many parties are involved in final decisions.

Problems with difficult construction conditions could be shared by giving bonuses to contractors/workers for meeting deadlines. This will encourage them to find solutions to problems.

Reduce

Careful planning could reduce the risks of unpopular actions e.g. destroying local shrines or significant buildings.

Careful research into future usage and traffic volumes e.g. industrial sites or connections to ports could ensure that roads were built to cope with actual expected impacts so mitigating costs of repairs and maintenance.

- (iv) The two extremes would be inadequate compensation or excessive compensation to buy-off any trouble.

It may be hard to determine the fair value to pay to the homeowners

Inadequate compensation

The government could take the view that as the project is in the national interest, citizens should be prepared to make sacrifices for the greater good.

In effect, they could argue that all land belongs to the state and it is up to the state to do with it as it sees fit.

This would clearly be a cheap option (given the scale of the project).

The government may be strong enough to resist protests of those affected (or receive support from those not affected).

Excessive compensation

Any taking of private land/property will cause problems as most people won't want to be moved against their will.

To avoid delays and costs in dealing with complaints or legal appeals, the government could make affected people an offer so generous that they can't refuse.

This could be cash in excess of what their assets are worth or alternative property/land in desirable locations that is more valuable than existing holdings.

This could become expensive or messy since sentimental (family history) values could be high, on top of monetary values. There is also likely to be a small number of individuals who won’t move whatever the price.

The most practical option will depend on traditions surrounding the power of the state against individual freedoms.

(v) **Discounted cashflow**

The value would be determined as the value of expected future income (or capital) proceeds from the asset.

For some properties, this could be based on the rental income that could be charged (net of maintenance costs)

However, it is likely that very few properties would be rented and so deciding on market rents would be difficult.

To reflect capital growth, an allowance would be needed for rental growth – this would be difficult to allow for even if current rents were available.

Although a broad-brush adjustment could be made to the discount rate used. That is value current income at a real rate net of rental growth.

Private homes may also contain a significant utility value i.e. as a place to live in, security for the family etc. So, a purely income based method may understate true value to the homeowner (and what they would need to buy a similar replacement).

Some of the land would be idle and so not generate any income. Hence it may not be reflected in any rental-based calculation.

For farmland (or land used for other commercial activities), a value could be placed on the future proceeds by looking at say crop yields, current commodity prices and making an allowance for future growth.

This would be a very subjective exercise.

Need to determine a suitable discount rate to use

Market value

The value would be determined as the value of asset, were it to be sold on the open market.

For private homes, there may well be active markets with regularly agreed sale prices that could be used as a basis.

However, given the nature of the economy, such sales especially in rural areas may be infrequent and so it would be difficult to find comparables.

In any event, prices in the relevant areas may be distorted up or down due to the proposed project and the expected attitude of the government towards compensation.

Hence it may be necessary to look at the prices people would have to pay to buy similar properties in similar areas where the distortions don’t apply.

It would be relatively easier to include smallholdings of land as part of the market value – irrespective of usage (again assuming an active market).

Larger land holdings could be based on market values of similar land – based on usage e.g. livestock or crops. However, sales here may be very infrequent and each holding would be unique making the exercise very difficult.

This highlights a general problem with both methods. In that heterogeneity of property would mean that in theory each may have to be considered individually, requiring expensive valuation process.

However, especially in urban areas, a lot of properties could be very similar e.g. in apartment blocks and so the difficulties caused would be dependant on the locations under consideration.

A practical approach may be to combine properties into very broad groups and apply common factors in terms of rents or values.

In general this question was well answered. The last two parts were more difficult for candidates – we were looking for common sense applications of possible theoretical approaches to the specific circumstances.

END OF EXAMINERS’ REPORT