

# **EXAMINERS' REPORT**

*November 2012 examinations*

## **Subject F102 — *Life Insurance* Fellowship Principles**

### **INTRODUCTION**

The attached report has been prepared by the subject's Principle Examiner. General comments are provided on the performance of candidates on each question. The solutions provided are an indication of the points sought by the examiners, and should not be taken as model solutions.

## QUESTION 1

(i)

Actively at work: an employee who is absent due to an accident or illness is ineligible for coverage until he or she returns to work.

Fall within free cover limits: amount of cover automatically granted without individual underwriting to members of a group scheme.

(ii)

Medical evidence can be obtained from the following sources:

- questions on the proposal forms
- reports from medical doctors that the applicant has consulted
- medical examination carried out by medical professional on behalf of insurer
- specialist medical tests on the applicant

(iii)

Need a reasonable volume of stable, consistent data; that can be used to deduce future experience and trends

It is important to decide on the period for which data is collected (too short insufficient data, too long no longer relevant)

Divide data into sufficiently homogeneous risk groups (use existing rating factors and other potential factors)

Need sufficient data in groups to be credible

Make adjustments for any trends in the data or unusual experience if necessary

Determine the number of deaths relative to exposed to risk for each group

Compare these rates to existing rates and industry norms

May add margins for uncertainty to the rates

(iv)

By increasing the risk rates the company risks losing business

Increase in premium may impact on the reputation of the company negatively

Company may also lose business for employers where rates have not increased significantly and lose potential new business

The company faces the risk that premium and investment income will not be sufficient to cover business expenses and finance new business plans

Selective withdrawals: Risk that only schemes with very high mortality risk stay with the insurers resulting in future mortality experience being worse than expected

Lower business volumes may result in higher claims volatility

*This questions was mostly bookwork and was well answered by most candidates.*

*Parts (i) and (ii) were straight forward bookwork and were well answered by most candidates. But several candidates failed to gain full marks for part (i) because they did not explain the underwriting implications for 'actively at work'.*

*Part (iii) was relatively straight forward and mostly bookwork. The question was well-answered for the most part. Students who scored well described the issues relating to the data as well as the process used for checking mortality rates for a group life scheme. Some students wasted time discussing applying credibility weighting factors to the data in detail.*

*Part (iv) required students to apply the principles discussed in the risks sections to the circumstances of the insurer. This question was relatively well answered, but most students failed to identify the full range of risks that the insurer could face. A few students failed to consider the issues relating to group life business and erroneously identified cost of providing surrender values as a risk to the insurer.*

## QUESTION 2

(i)

The company will encounter additional new business strain as a result of writing more new business

New business strain arises through

- High initial expenses (commission and administration costs)
- Reserves and capital required to support policies
- Levels of reserves and capital required will depend on the regulatory environment

The insurer may also need additional margins for prudence in case experience is different than expected because they have not sold policies in these provinces before

(ii)

Reinsurance can reduce the financial risk associated with new business

- Through an increase in its available capital or
- Through a reduction in its financing requirement
- Reducing new business strain means that more new business can be written for the same amount of capital

Original terms reinsurance (usually on a quota share basis) or financial reinsurance can be used e.g. an asset enhancing transaction

Financial reinsurance of an existing block of business will improve the balance sheet of the company immediately by increasing the available capital (more new business may be written before the resulting new business strain leads to an unacceptably low solvency position)

Any original terms reinsurance will mean some of the liability is passed to the reinsurer

The company will need to hold lower statutory reserves (up to limits imposed by the regulator), reducing capital strain

Initial reinsurance commission will make a contribution to the company's income, effectively discounting the future profits that will be tied up in the reinsurance premiums

Quota share reinsurance gives the insurer greatest control over the amount of financing it will receive in relation to the volume of business

Reinsurance is an important part of the company's strategy for financing the new business strain relating to the expansion of the products to other provinces

Retention levels have to be set at a level that balances the need for support in financing new business strain and without giving too much of the business profit to the reinsurer.

The cost vs. benefit of reinsurance would need to be evaluated.

(iii)

A life insurance company could seek reinsurance to:

- Limit the amount paid on any particular claim
- Limit total claims payout
- Reduce insurance parameter risk
- Reduce claim payout fluctuations
- Smooth profits
- Receive technical assistance (e.g. risk and lapse rates etc)
- Get access to the reinsurer's u/w system and/or manual.

- Increase profits (through regulatory or tax arbitrage) or return or risk-adjusted return on capital (by reducing risk cost or increasing volumes)
- Separate out different risks for products (eg investment and longevity risks for immediate annuity products)
- Allow aggregation of risks the cedant cannot manage on its own, so allowing manufacture of product lines

*The key point to part (i) was that there will be new business strain. Some students spent too much time addressing practical issues such setting up offices, distribution etc, which is missing the point of the question.*

*Part (ii) required a discussion of how reinsurance can relieve the pressure on solvency, especially with regard to the expansion. It did **not** ask for a generic discussion of benefits of reinsurance (see part (iii)), which is what some students embarked on, only to score poorly.*

*Part (iii) was straight forward bookwork. The instruction was to “state”, not “discuss”, advantages of reinsurance. Some spent too much time on discussing a point with the result being a too limited range of ideas to score well.*

## QUESTION 3

(i)

### Demographic factors

Sex:

- Both incidence and termination rates may differ by sex
- The exact nature of the difference will depend heavily on other factors

Age:

- Disability incidence rates typically increase with age
- Termination rates as a result of mortality may also increase with age
- However, it is possible that fewer policyholders will return to work at older ages, reducing terminations

Smoking status:

- Smoking status impacts negatively on the general healthiness and lifestyle of the policyholder.
- This may cause both higher incidence rates and lower terminations
- However, higher terminations due to death could also be observed

Policyholder occupation:

- Occupation has a clear impact on inception rates, for example it would only take a small injury to a surgeon's hand to cause disability compared to that for a manual labourer, but the manual labourer is more likely to be exposed to the risk of serious injuries while at work
- Termination rates can also depend on occupation, both as the result of the level of injury required to cause disability as well as the impact of job satisfaction in certain occupations relative to others

Geographic region:

- Both incidence and termination rates will vary by geographic region
- For example, there may be more AIDS related disability claims in provinces with high HIV/AIDS prevalence rates. Terminations due to HIV/AIDS deaths may also be higher in such provinces
- Remote areas have limited access to medical care – termination rates lower due to recovery, but may be higher due to death

Personal medical history/family medical history

- Some people are genetically more prone to diseases – will probably not be able to use this factor to rate on
- People who have been very sick in the past, are more likely to get sick again, and possibly stay sick for longer

(ii)

The main reasons for a deferred period are:

- To allow benefits to integrate with employer-supplied benefits
- To reduce the number of claims
- To reduce the cost of claims to the insurer, insurer's administration costs (and therefore the price/premium)
- To meet true customer needs; most policyholders would not need to submit a claim for a couple of days off with flu
- Will eliminate claims which are less severe
- Gives insurer time to implement rehabilitation procedures

(iii)

An increase in the deferred period may help to increase profitability:

- by reducing claims
- by reducing costs of administration

However the change may not be suitable to HFB (the beneficiaries of the policy) if the deferred period becomes too long, as the change increases credit risk to them (clients get ill, stop work and default on mortgage payments)

However nil deferred period may be too generous if it leads to claims from individuals who are only sick for a few days/weeks and then return to work

When introducing deferred period, claim termination rate due to recovery will also probably be lower, because only really sick people will still be claiming after deferred period

Although terminations due to death might increase

Claims volatility reduces, hence reinsurance costs would reduce

Lower statutory reserving requirements (as a result of all the benefits mentioned above)

The comparison with other instalment protection products is not necessarily appropriate as in this case the purpose of the instalment protection is to protect the bank

Introduction of deferred period may lead to lower sales because the fact that there was no deferred period gave bank and insurance company a competitive advantage

Deferred period does not meet needs of self-employed who doesn't have employer-supplied benefits

(iv)

#### Product design

#### **Introduce reviewable without-profit premium rates, or change from non-profit to unit-linked with reviewable charges:**

- This would allow an increase in premiums/charges in the event of deteriorating claims experience
- Lower guarantees should result in lower capital requirements, increasing return on capital

Risk:

If significant this could increase risk of lapse (and default on the mortgage) if premium increases become unaffordable (the premium payable already varies in line with mortgage repayments)

Or selective withdrawals of healthy lives

#### **Change the occupational-based claims definition to be more strict:**

- If the occupation-based definition results in claims but claimants are still able to work and earn an income, then the claims definition is too generous and needs to be changed.
- Change from own occupation to own or any occupation
- Could use alternative incapacity criteria (e.g. FATs, ADLs, ADWs, PCAs)

Risk:

It is unlikely that an alternative incapacity criterion will be suitable as the linkage to earning capacity (weaker link between claim criteria and the ability to repay the mortgage loan than with an occupational-based criterion).

#### Rating

#### **Increase the premium rate.**

Risk:

Fewer clients use HFB for their mortgages, leading to lower business volume for GHI (and HFB). This is a particular risk if other banks do not require an instalment protection policy or if their premium rates are lower.

### Underwriting

#### **Investigate the possibility of changing the underwriting.**

There is currently no control over initial underwriting, as GHI is obliged to offer instalment protection to HFB's clients. Discussions could be held with HFB to see if there is any chance of changing this, or to ensure that lending criteria are not weakened.

Risk:

HFB would not want to lose its core business by introducing strict underwriting. This would also mean reduced business for GHI.

### Claims management

#### **Reassess the current claims management policy.**

Risk:

If claims management is made stricter, and some valid claims are repudiated it could result in lapses and mortgage default.

### Expenses

#### **Try to streamline the administration function to reduce costs e.g. use of greater automation.**

Risk:

Expense cuts could result in poorer servicing of policyholders, with associated complaints and poor public image.

Weaker claims management will have associated increased claims costs.

### Required capital

#### **Change capital requirements,**

provided the directors are comfortable with lower capital levels. Consider whether capital buffer is unnecessarily high, especially compared to statutory minimum. Risk:

Increased probability of insolvency and regulatory intervention.

### Other points given:

Introduce waiting period to reduce anti-selection risk – but could lead to lower sales

Introduce proportional benefits to those who return to lower earning job – to encourage to return to work

Linked-claims periods could be introduced to encourage people to return to work without fear that they would need to wait out another deferred period if they get sick again.

Rehabilitation services could be introduced during deferred period (and thereafter) to give people advice on how to get well which may help to improve claim termination rates.

Reinsurance can be taken out – reduces capital requirements – risk of default, and profits as well as losses shared with reinsurer

Could get HFB to give clients a fixed interest rate rather than variable rate – reduces uncertainty – reduces capital requirements.

Or provide fixed/reduced/proportional payments upon disability – but unlikely to meet policyholders needs or HFB's needs, because higher risk that mortgage repayments can't be made in full

*Students did not do well in this question. In part (i), many students saw 'demographic factors' and started listing demographic assumptions. Some students understood 'incapacity based on occupational definitions' as unable to do occupation due to losing your job, rather than due to illness. In part (iii) many students failed to note the impact on HFB of introducing a deferred period. Similarly, in part (iv), some students came up with good ideas of how to reduce expenses or claim costs, but didn't state that it increases the risk to HFB, and then didn't get the marks.*

## QUESTION 4

(i)

The surrender value will be the expected present value of the net future cashflows (claims + expenses less premiums)

In calculating prospective reserves, *assumptions* will be needed for interest, expenses, expense inflation and mortality. It might also be necessary to make assumptions in respect of tax

### Interest

This will be the most important assumption

A company might consider the current weighted average redemption yield of suitable securities to be its best estimate assumption

It may also consider the interest rate used in the premium basis if it wishes to use a blended basis

### Expenses

Consider most recent expense investigation for renewal expenses

May well be the same as those used to set current premium rates

Allowance also needs to be made for the expenses involved in surrendering the policy

Renewal commission could be allowed for as paid

### Inflation

Chosen to be consistent with the investment return assumption

Consider real return anticipated on index-linked government stock to give an indication of expected inflation

### Mortality

The mortality basis chosen should reflect the future expected mortality of those policyholders who are surrendering

(May be lighter than for policyholder who do not surrender)

Although less risk here of selective withdrawals because forced to withdraw if moving to private sector (may be big portion of total withdrawals)

Could track mortality experience of previously surrendered policies, but difficult since lapsed policies not tracked

But for most assurance contracts that have surrender values the mortality assumption will not have a large effect upon the resulting value)

It is unlikely that any margins would be included in the assumption as these will increase the surrender value

Having computed prospective values, surrender value terms would need to allow for loss of future profits from such surrender

Surrender penalties may also need to be considered.

Competitive pressures would need to be considered

If best estimate assumptions used, all profit from non-surrendered policy would be made

If premium basis assumptions used, profit made to date would be made

SVs based on premium basis at start to best estimate basis closer to end would be common

(ii)

Low surrender values at early durations compared to premiums paid

This may be contrary to policyholders reasonable expectations (depending on the policy documentation and industry practice)

It may also seem unfair because policyholders are forced to surrender if they change employment to the private sector

May lead to poor reputation and low sales

Also risk the intervention of regulator if low surrender values/severe penalties are reported to regulator and the regulator deems that intervention is necessary due to unfair treatment of policyholders

The losses on surrenders at short durations would have to be cross-subsidised by profits at later durations

the company risks making losses if the mix of surrenders at early and late durations is different to the assumptions used in determining the surrender basis and penalties

Financial risk of withdrawals at early durations when asset share is negative

*Very many students listed the 'principles of setting surrender values' rather than the 'assumptions' to be used when determining surrender values. Read the question.*

## QUESTION 5

(i)

### Use of option prices

Maturity guarantee is a European style put option corresponding to the maturity value.

Surrender and death guarantees are a American style put option.

It is difficult to ensure that the whole investment fund corresponds to a single option traded in the market.

Approximations may be used using combinations of market indices for bonds and equities.

### Stochastic simulation

A stochastic model of the rates of return on investments is used to simulate the future price of assets.

The assumptions underlying the model need to be consistent with the planned investment strategy.

Assumptions on the rate of exercising the option based on expected policyholder behaviour will need to be made.

A large number of simulations will need to be performed in order to obtain reliable estimates.

These simulations will generate a probability distribution of the PV of the cost of the option.

The insurer can select the required loading for the cost of the option at a level where there is a high probability that the loading will be sufficient.

(ii)

The cost of the minimum death and maturity guarantees needs to be funded from the charges (unallocated premium and annual management charge).

Expenses, cost of capital and profit to the company are also funded by charges.

Expenses relating to this product will include:

- Initial expenses: commission, sales and marketing related expenses, initial policy set up costs
- Ongoing expenses: ongoing management costs, investment costs
- Maturity/ termination costs: administration on maturity or termination of policy

The amount deducted as charges will start at quite a low level, and then grow each year as the fund increases.

Timing of expenses, cost of capital and cost of investment guarantees are not well matched by the current charging structure of the policy.

- Initial commission on policy is large and payable for the first two years of the policy
- Sales and marketing costs and initial set up costs will be probably expressed as a premium related cost that will also be at the start of the policy
- Renewal expenses will be expressed as a per policy cost and paid annually
- Initial charges are likely to be insufficient to cover initial costs
- Early surrender will result in a loss to the insurer
- Fixed and overhead costs and claims and termination costs are not matched by any specific charges, but are likely to be small
- Investment costs are likely to be expressed as a percentage of the fund each year (matched to fund charge)

Charges at the start of the policy will not cover the initial costs of the insurer and cost of capital strain.

Charges at later durations are likely to be greater than the ongoing costs and investment costs.

The annual management charges, being a percentage of fund, leaves the company exposed to stock market fluctuations particularly at later durations when the majority of the charges will be of this form.

The charging structure may well meet the company's profit criteria, but it is not very capital efficient and so is only viable if the company has access to plenty of capital.

(iii)

#### Use of Actuarial Funding

Actuarial funding is a technique whereby insurers can hold lower unit-reserves for unit-linked contracts and thus reduce new business strain...

... by taking credit for some of the extra future annual management charges (above those required to meet ongoing expenses) by actuarial funding. .

It is usual to hold unit funds that exactly match the value of units purchased.

However, the full value is only needed at surrender, maturity or death.

It is therefore possible to hold the actuarial present value of the unit fund rather than the fully funded value.

If  $UF_t$  is the fully funded number of units purchased at time  $t$ , then the amount needed to be held is  $UF_t A_{x+t:15-t}$  ( $1 - UF_t A_{x+t:15-t}$  can be transferred to the non-unit fund).

The discount rate should be less than or equal to the annual fund management charge in order to meet future obligations.

Actuarial funding will create extra cashflow into the non-unit fund, particularly at early duration which will help to reduce new business strains.

Future fund management charges are converted to cash at the outset of the policy, which is a better match to the initial expenses.

But the company needs to ensure that amount held in the unit fund is sufficient to pay out the value of units on surrender, as it does not hold sufficient units.

Need to check whether the surrender value (taking into account the surrender penalty and the surrender terms offered to the policyholder) is in line with the actual units held.

*Part (i) required candidates to identify and describe the methods to price the guarantees on the product. Most candidates identified the methods correctly. Stronger candidates were able to provide detail on how the methods could be applied*

*Part (ii) required candidates to assess the degree to which expenses and charges were matched. Candidates performed exceptionally poorly in this question. Many provided unnecessary detail on the implications of the weaknesses on the insurer rather outlining the actual weaknesses of the charging structure.*

*Part (iii) was straight forward bookwork, nevertheless a large number of students did not get full marks for this part.*

## QUESTION 6

(i)

The liability under a with-profits policy is partly guaranteed in monetary terms (the basic sum assured and reversionary bonus, once declared) and partly discretionary.

In terms of the discretionary component the insurer would aim, as far as possible, to invest to provide returns that meet with the reasonable expectations of policyholders.

PRE is influenced by marketing material and returns on similar products in the market

But policyholders who take out a with-profits policy will expect the proceeds to maintain their value in real terms.

An appropriate investment strategy for these liabilities would have been a mix of fixed-interest securities, equities and index-linked bonds.

But the high proportion of terminal bonuses will imply a higher proportion of equities.

The level of freedom that the insurer has to depart from a fully matched strategy will depend on the level of free assets.

(ii)

A decision will be required in respect of the equitable distribution of existing surplus in the with-profit fund.

(e.g. The surplus could be distributed to current policyholders via a special reversionary bonus.)

The implications for the fund going forward and possible reactions from the insurer will depend on the current level of reversionary bonuses targeted by the company.

As the company distributes a large portion of the surplus via terminal bonuses current reversionary bonus rates are likely to be low, and thus the proposed guarantee is likely to lead to an increase in reversionary bonus rates and hence lower terminal bonuses.

The level of free assets is likely to be reduced in the future

More working capital may be required for these policies.

The shareholders may require an increase in capital charges because of the guarantee.

In addition the guarantee is more onerous if the with-profit fund also participates in mortality/expense experience (poor mortality/expense experience could lead to the CPI guarantee biting).

Insurer may change the investment strategy to match the guarantee introduced new regulatory requirements

- E.g. more inflation-linked bonds to match the CPI guarantee.
- Matching investments may not be available in the investment market
- This will have associated costs.
- The change may come at an inopportune time e.g. if asset values are currently depressed.
- Because this guarantee applies to the industry as a whole, the demand for inflation linked bonds may increase, making these assets relatively more expensive.
- Tax payments are accelerated because of the realisation of assets.

The level of investment freedom and the ability of the insurer to maintain a mismatched investment strategy is constrained by the level of free assets of the insurer.

The changes will have to be communicated to existing policyholders and agents/brokers, increasing costs.

Policyholders may value the additional security provided through regular declarations of bonuses relating to CPI.

But the change the investment strategy with its resulting costs may reduce overall benefits for policyholders.

There may also be an increase in premiums due to cost of guarantee.

Because historically most of the bonus has been distributed via terminal bonuses, it is likely that some policyholders may not want the guarantee / possible increase in premium / possible change in investment strategy, which could lead to.

- An increase in withdrawal rates.
- Decrease in new business volumes.
- This in turn may result in an increase in per policy expenses.

The company may withdraw from the with-profit market.

*Note:*

*Because this change applies to the industry, no marks are available for comments relating to the change in competitive position.*

*Part (i) was fairly straight forward application of bookwork and a number of candidates answered the question adequately. Candidates who scored well were able to discuss the investment strategy in relation to guaranteed and discretionary benefits and identified that investments were likely to be weighted towards equities.*

*Part (ii) was poorly answered. Many candidates failed to discuss the issues relating to the distribution of the current surplus or the need to communicate the change to policyholders. Better candidates discussed the possible impact of the change in regulation on the insurer and policyholders and their possible responses in detail. A number of candidates wasted time repeating points that they had made in the discussion of the impacts of the new regulations in their later discussion on the possible responses of the insurer, which shows poor planning.*

## QUESTION 7

(i)

### General

These two policy objectives may be in conflict.

Setting financial soundness requirements at a more prudent level will give more protection to policyholders,

But may be too onerous to encourage the expansion of the industry. A balance must therefore be reached in achieving these objectives.

### Valuation of policyholder liabilities

The method of valuing the liabilities could prescribe the gross premium valuation method. For simpler products a net premium valuation can also be used.

For a developing country, it is likely that products would be simple, with low guarantees.

For this type of business approximate methods may be suitable.

The reserves must be sufficient to cover future cashflows:

- guaranteed benefits (guaranteed surrender values, non-unit reserves, options, past declared and future bonuses)
- expenses; including commission

Expected future premiums should be allowed for.

Need to consider allowance for reinsurance.

Assumptions including the discount rate, demographic, withdrawal and expense assumptions should be chosen on prudent basis (margin on best estimate).

### Valuation of assets

Asset valuation method may be prescribed e.g. use of market value or discounted cashflow method.

The basis may be prescribed e.g. for market value: bid, offer or mid market price.

Limits on admissible assets for valuations purposes to promote adequate diversification.

### Solvency capital requirements

Solvency capital provides an additional level of protection for policyholders.

Solvency capital should reflect the extent of prudence in the liabilities (more a prudent liability implies a lower solvency capital requirement).

The regulatory framework can include an approximate simple method for solvency capital (like a percentage of liabilities).

Alternatively, a more complex method for determining solvency capital that reflects the amount of risk of the business written may be used.

This includes lapse, surrender, investment, mortality risk etc.

(ii)

Possible regulatory restrictions:

- Restrict the terms and conditions of product designs, e.g.
  - Minimum term of policies.
  - Maximum surrender penalties.
  - Give policyholder the right of cancellation.
- Restrict the premiums or charges that can be used for some contracts.
- Restrictions on the channels through which life insurance may be sold.
- Requirements as to the procedures to be followed/information required to be given as part of the selling process, e.g.
  - Charges

- Illustrated maturity values
- Restrict the ability to underwrite or differentiate between classes of policyholders, e.g. restrict use of genetic testing
- Disallow use of gender as a rating factor

(iii)

An investment analyst aims to assess both the current financial position as well as the likely *future performance* of life insurers. This will allow them to recommend buy or sell opportunities to potential investors.

In order to achieve this, the investment analyst will compare his estimate of the value of an insurer to the share price.

A valuation might comprise the following elements:

- The embedded value of the insurer.
  - The embedded value represents the future profit stream of the company's existing business together with the value of any net assets separately attributable to shareholders. A value for goodwill (based on a valuation of future new business)
  - Future expected future dividend projections (taking into account the regulator's requirements for dividends declared)
- The investment analyst is expected to use a risk adjusted basis

Future new business opportunities are important in these assessments.

The regulator will be concerned with the insurer's ability to meet policyholder obligations in the future

The financial soundness of the insurer will be assessed according to whether the insurer meets the required minimum solvency margin as set out in the regulations usually on a prudent basis.

Future new business is less important.

However future new business plans become important for insurers that are not solvent or barely solvent, as new business will require capital which may not be available to the insurer and which may reduce solvency even further.

The regulator will also be less concerned with the embedded value and future dividend payments to shareholders. (Provided dividends do not threaten solvency)

*Part (i) required students to apply the principles of reserving and solvency requirements to a developing insurance market. But few candidates covered all the issues that needed to be considered i.e. regulatory objectives, reserving principles, valuation of assets and solvency requirements. Although the discussion of the principles of reserving was bookwork there were a number of candidates that failed to discuss these principles. Candidates also gave too much detail on individual elements of the reserving calculation (e.g. allowance for bonuses) and then did not discuss the full range of principles.*

*Part (ii) was well-answered, candidates who mentioned the type of restriction supported by an example scored well.*

*Part (iii) was poorly answered. Many candidates failed to discuss the future profitability of the insurer and embedded value as an important consideration for the investment analyst.*

**END OF EXAMINERS' REPORT**