

EXAMINERS' REPORT

November 2011 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. Principles of investment that apply to a life insurance company

- Select investments appropriate to the nature, term, and currency of the liabilities.
- Select investments to maximise the overall return on the assets (income and capital)

- Can depart from the first principle in order to improve the return, depending on resources
- available to cover adverse returns, including free capital.

Or

Alternatively they can be expressed as:

The company should invest so as to maximise the overall return on the assets, subject to the risks taken being within the financial resources available to it.

(With some discussion of the principles above)

ii. Appropriateness of asset mix for products A and B

Product A

The liability outgo is fully guaranteed in monetary terms. The appropriate matching assets to back this are therefore fixed interest type investments of appropriate term (10 years) and currency.

Depending on the term of the medium term bonds, the investment selected appears to have met these criteria.

Product B

The liability outgo is partly guaranteed in monetary terms (the basic sum assured and reversionary bonus, once declared) and partly discretionary.

The investment strategy (investment in fixed interest securities) is appropriate for the guaranteed portion of the liabilities.

The company will want, as far as possible, to invest so as to maximise returns for the discretionary benefits as it will improve the returns to policyholders.

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

The investment in fixed interest securities is unlikely to be appropriate to fully back the discretionary benefits (or suggestion that an investment in real assets eg equities might be more suitable for the discretionary benefit)

But if described in marketing material, the current strategy will be consistent with PRE.

iii. Considerations around adding equities to the investment portfolio

Introduction of equities to the investment mix allows the investments to be consistent with the strategy of maximising investment returns for discretionary benefits.

The appropriate proportion to be invested in equities will depend on the level of the discretionary portion of benefits relative to the guaranteed benefits as well as the financial resources and attitude to risk of the insurer.

- The higher the basic sum assured for a given premium, the greater the proportion of fixed interest type investments that should be held.
- Methods that defer distribution of surplus need a lower proportion of fixed interest investments.

But returns on equities are expected to be volatile and policyholders will expect the bonus rates to be smoother than returns earned on equities. The impact of this smoothing will reduce the free assets when equity returns are low and increase them when equity returns are high. The company therefore needs sufficient free assets to smooth the bonus rates.

If there is a low level of free assets, this will limit the extent to which the company can invest in equities unless shareholders are willing to inject significant capital into the company.

The insurer can mismatch if there are sufficient free assets that are not used to support mismatching on other products. But if they depart from a matched strategy, there is no guarantee on the returns earned on equities and this strategy may open the insurer up to the risk of insolvency.

Investing in equities is likely to lead to more stringent reserving and solvency requirements (resilience reserves).

Investment in equities must be consistent with regulatory requirements. (Regulatory rules may limit the types of amounts of assets of certain types that can be held.).

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

Part (ii) required candidates to apply investment matching principles to the two products and was reasonable well answered. Candidates who scored well were able to discuss the investment strategy in relation to discretionary benefits.

Part (iii) was poorly answered. Many candidates did not relate their discussion to the two products. As a result they failed to discuss equity investment in relation to smoothing of bonuses for the with profit product.

QUESTION 2

- Factors to be considered when setting withdrawal assumptions

Consider withdrawal basis used in the previous valuation.

Base on analysis of company's recent experience making allowance for special factors such as an adverse economic situation.

Split data by duration, product and type of withdrawal

Need to make adjustments for expected future experience

Factors relating to the closure of the insurer

- If a sales force that is no longer employed serviced the clients, the level of contact will reduce and this may adversely affect persistency.

- If another life insurance company purchased the sales force then the clients may be actively targeted and encouraged to transfer.
- Policyholders may have a lack of confidence in the company now that it has closed, which may cause surrenders to increase.
- There may be significantly higher withdrawals immediately following the closure that have not yet come through in the data .
- However, if there are surplus assets (or .estate.) in the fund then the prospect of sharing in their distribution may have a positive effect on persistency.

General market factors that may affect withdrawals

- Consider how actions of competitors (eg through the introduction of new products that may be more appealing to policyholders)

ii. Additional risks to insurer as a result of closing to new business

Higher withdrawal rates may introduce immediate liquidity risk due to non-payment of premiums and surrender benefits.

The level of risk depends on the mix of recurring/single premium business and the size of any surrender benefits.

If withdrawals are selective, this may result in mortality experience being worse than expected. As volumes decline as the book runs off (exacerbated by the withdrawals), overheads will be spread over fewer policies.

Mortality experience will also become more volatile.

There may be extraordinary costs associated with the closure that may be higher than anticipated.

As the assets decrease, diversification may become more problematic, resulting in higher investment risk.

The closure itself may damage the reputation of the company .

- This would be exacerbated if there are retrenchments as a result of the closure.
- If low staff morale or shrinking service teams result in poor client service.
- If the closure is a result of regulatory intervention due to a weak solvency position

Since this is with-profits business adverse experience may be passed in part to the policyholders but the company may be constrained by PRE and policy wording in terms of how much the bonus can be reduced.

Reduced staff may result in operational risk as remaining staff take on more responsibilities in areas where are less experienced.

Both parts (i) and (ii) of this questions were very poorly answered.

For part (i) many candidates failed to answer the question explaining surrender values or the implications of withdrawal assumptions on the financial results of the insurer. Candidates also failed to generate sufficient points on possible reasons for needed to adjust withdrawal rates.

For part (ii) solutions contained a lot of repetition and irrelevant detail on individual points. In addition most candidates failed discuss a sufficient range of risks facing the insurer.

QUESTION 3

i

The purpose of underwriting is:

- To protect the integrity of the risk pool against anti-selection
- To create homogeneous risk pools that are charged premium commensurate with each pool's risk
- Broaden access by allowing for additional risks to be dealt with appropriately

ii

Financial Underwriting

The company will gather information on the applicant's income and total sums insured (possibly even across insurers if this information is available). Affordability of premiums is also assessed, since if premiums become unaffordable the risk of lapsation will increase not only could this lead to the non-recovery of initial expenses, Lapses will invariably be selective Worse risks may be willing to pay premiums that are much higher proportions of household budgetshare than better risks. So this form of underwriting may detect more anti-selective behaviour but the company may also face a change in mortality experience due to an altered mix of business and cross-subsidies in the pricing structure. The main purpose of financial underwriting is to make sure that the policyholder is not over-insured, as this can pose a moral hazard.

Occupational underwriting

The purpose of occupational underwriting is to assess whether the applicant has an increased risk of dying due to the nature of their occupation. Occupational underwriting looks at whether the actual occupation is dangerous, e.g. bomb disposal expert, and other factors, such as how far the individual needs to drive as a result of their occupation.

Avocational underwriting

The purpose of avocational underwriting is to assess whether any such pastimes pose an additional risk. Avocational underwriting will gather information on whether the applicant partakes in any dangerous pursuits, e.g. mountain climbing, paragliding, motorcross racing, quad-biking etc

Territorial underwriting

The underwriter will assess the countries the applicant intends travelling to (and for how long), whether it be for work or vacation. Travel to certain countries can pose additional risks, e.g. relating to tropical diseases, lack of medical care, civil unrest, etc.

iii

- Insurer's own experience of similar product
- Most appropriate as reflects own target market
- Reinsurers data (reinsurer will have wider data base and likely to be more relevant type of business and lives covered might be important since this is a small insurer that is not likely to have sufficient information)
- Industry (insured lives) mortality statistics, possibly produced by the actuarial profession
- National mortality tables to use as a base (One would use this because alternatives are not available)

iv Numbering for this level uses lower case roman numerals

Comment

Although past adverse experience is a concern for the insurer, the reinsurance programme should be set with reference to expected future experience. Recent adverse experience is only relevant to the extent that this changes the expectations of future mortality experience of the insurer. Optimal type and retention level achieve desired level of risk with minimum cost.

Approach

A stochastic model office including assumptions on a mean mortality rate and random fluctuations may be used to determine the appropriate type and level of reinsurance. Assumption used in the modeling exercise should be based on expected future mortality and policies in-force.

Quota share

Reduction in retention limit reduces the risk retained by the insurer and scales the volatility down QS not effective in handling claims fluctuations (in number and size of claims).

The insurer will still experience some volatility in mortality experience (net of reinsurance).

Lowering the retention level will cede more risk to the reinsurer, but the insurer will pass on more profits to the reinsurer . One may also consider other types of reinsurance that handle fluctuations of claims better (individual basis). Surplus reinsurance, where the insurer retains risks up to the retention limit

Risk premium reinsurance (constant or XX) where the insurer cedes part of the sum at risk of each policy (but risk premium reinsurance more admin intensive).

Catastrophe

Cat cover, where the minimum number of deaths caused by a particular event up to a certain limit per life insurer and in aggregate is effective in handling the risk of accumulation of claims.

The insurer needs cat cover given the region that this insurer is operating in (dense population with seismic risk) there is a significant risk of accumulation of claims.

Under catastrophe cover is tail risk (extreme events) are ceded to the reinsurer.

Cat cover lowers the probability of ruin and avoids deterioration in the solvency position, which is important in this case where the insurer is concerned about the solvency position.

Considerations

Free assets and importance of stability of the solvency levels – will influence the desired level of risk. Need to consider the terms and conditions available on different types and retention levels. Other benefits e.g. reinsurance commission, profit sharing, technical assistance. Options other than reinsurance e.g. consider the cost of financing a reserve for mortality fluctuations vs the cost of obtaining reinsurance.

Counterparty risk: even if the insurer cedes most of the risk to the reinsurer, insurer still liable for the claims if the insurer defaults, need to consider the risk of default of the insurer.

Reinsurance programmes for other business.

i.e. reinsurance programme for this book of business within the overall reinsurance programme of the insurer and the effect of overall solvency of insurer.

Parts i – iii were very easy bookwork and almost all students scored very well. Part iv was an application and most students struggled. Students wrote about reinsurance in general rather than the evaluation of the reinsurance programme. Many students also suggested a reinsurance programme rather than discussion the evaluation of one. These answers did not address the question and no marks were given.

QUESTION 4

i)

- The with-profit contract participates in the profits/losses of a defined book of business
- A regular bonus is usually added annually which will be calculated in relation to premiums paid to date plus previously declared bonus
- A terminal bonus might also be added when a policy becomes a claim (e.g. on death, maturity or surrender)
- Once-off sources of profit could be distributed as once-off immediate bonuses as may be done with conventional with-profit contracts
- It looks and operates like a unit-linked contract, but the key difference is how the unit prices and hence benefits are determined
- Either additional units are allocated to each contract and the price of the unit remains constant or the unit price is changed to reflect the annual bonus rate (instead of additional units)

- There is a minimum guaranteed increase/addition (equal to 0% p.a. on net premiums) because bonuses already declared cannot normally be removed
- Other guarantees is at the company's discretion
- On surrender, the company will apply a surrender penalty
- May retain the right to apply a market value adjustment (MVA)
- The size of the MVA is at the discretion of the company, bearing in mind policyholder expectation while the surrender penalty is usually specified in the policy
- Death benefits could vary according to the type of policy, for example a guaranteed sum assured, return of premiums, return of fund
- It is not usual for an MVA to be applied to death benefits
- There is flexibility in terms of premium payments, which may be single lump sum, recurring single premiums or regular monthly or annual premiums
- Charging structures could be any combination of charges
 - policy fees (from premium or fund)
 - allocation rates
 - bid/offer spreads
 - annual management charges
 - risk benefit charge
 - Actuarial funding
 - Front-end load
 - Capital and accumulation units
- Or alternatively the charges could be taken implicitly through the bonus rate, with no explicit charges used.

This is a bookwork question. Students performed surprisingly poorly in this question. Overall there was a lack of understanding between the differences between accumulating with profits and conventional with profits. Where students did differentiate this correctly, insufficient detail was provided to score well.

ii)

- The minimum guarantee that policyholders are likely to appreciate is 0% per annum i.e. a return of premiums (after charges)
- However, guarantees offered by competition should also be considered, which may be higher e.g. 2–3% p.a.
- Alternatively, policyholders may want a return that would at least cover the charges on the product
- Capital requirements should also be considered as statutory reserves will be influenced by the guaranteed rate
- The guarantee that can be offered is dependent on the underlying investments backing the units
- Equity investments provide the best long term returns but returns are generally more volatile

- A more conservative strategy may reduce risk but is inconsistent with policyholder expectations but may reduce the cost of the guarantee
- As a pure equity strategy may increase the cost so much that it is unaffordable
- The impact of either an increased cost and/or the change in the different investments available should be weighed up against the marketability of the guarantee.
- If a market value adjustment (MVA) cannot be applied on surrender, it will make any guarantee more onerous. Even if the MVA can be applied contractually, there may be marketing reasons not to apply it
- Tax on investment return should also be taken into account, because it reduces the investment return
- A higher guarantee would reduce profitability when investment returns are poor but would increase profits otherwise. Would need to set the guarantee such that the probability of profit on the product is sufficiently high.
- The level of the guarantee in comparison to other products offered by the company needs to be compared to avoid the possibility of lapse and re-entry

*Students appeared to perform better in this question than 4 i). Overall the performance was still poor as many students did not appear to focus on the question asked. The question specifically asked about setting of the **guaranteed element** of the regular bonus rate.*

QUESTION 5

i The following points scored credit

Surrender penalties need to be set considering what the initial expenses are and what the mechanisms are for recouping them.

Penalties should limit losses or capitalise on some forgone profit however at early durations the asset shares may be negative, and a loss may be unavoidable.

E.g. if using capital and accumulation units, would want a unit related penalty.

The insurer will want to profit test the surrender penalty assumption, however they will need to exercise caution in that RP and SP withdrawal experience will be different so cannot rely on own data

It may be a statutory reserve requirement that reserves cannot be less than the surrender value, hence the penalty will impact on capital requirements which will need to be taken account of in profit testing

The surrender penalty will constrain actuarial funding factors

Penalties must be in line with regulation.

Penalty should run to zero (or a low amount) near to maturity (note that this is not the same as saying the surrender value should be in line with the projected maturity amount)

PRE, as determined by marketing material, disclosures etc must be met.

Penalties should not be significantly worse than that offered by competitors.

Surrender penalties must not be subject to frequent change for reasons that would be unclear to the policyholder .

Penalties should be consistent with surrender values on similar conventional business.

Penalties should be easy to document and explain

Terms should not encourage lapsation which will impact on fixed expense recovery

Penalties should cover the cost of withdrawal.

- ii The model projects expected cash and profit flows for a single policy. These results would then need to be grossed up based on the projected business mix. The model would need to be able to take different charging structures into account. The unit fund(s) and non-unit fund would need to be projected. The model would need to make an allowance for the surrender benefit and possible zeroisation of negative non-unit fund cashflows after year 1 as well as any actuarial funding. The net projected cashflows would then be discounted at a risk discount rate reflecting the required return on capital and the risk attaching to the cashflows. The profit may be measured as a net present value, profit margin, internal rate of return or discounted payback. □ The model may be stochastic or deterministic.
- iii One product may be more profitable than the other or offer more stable profits for different economic scenarios or for different business mixes. One may involve cross-subsidies that may appear unfair.

The first design is less capital intensive. The second design can be made less capital intensive by using actuarial funding (subject to regulation and the extent to which actuarial funding can be used given that a surrender benefit is offered). The front end load may make meeting early death guarantees more onerous.

The second design may be more administratively difficult to manage than the first but consider any other unit-linked products the company offers. In general, whichever design appears more consistent to consumers and is more consistent administratively would be preferred.

Front end load is unappealing to investors, particularly for policies of short duration. But the 2 unit funds are confusing. Sales channels should be considered: front end load highlights commission and hence won't appeal to brokers.

Consider competitors – if we price similarly to them, structure will appear more acceptable. But comparability will increase competition on pricing. Any regulations on pricing should be considered. Pricing must not appear to be unfair or overly penal in first 2 years.

Capital units can be viewed as deceptive. They can be equally as penal for surrenders as a front end load if surrender penalties are sufficiently high (but this may be difficult in practice).

The front end load is a poor match for ongoing expenses and hence sensitivity to expense inflation should be tested.

Capital units do not provide a good match for initial expenses by nature (unit vs monetary) and term. Poor investment returns may result in under-recoupment of expenses in structure b but this should nevertheless provide a good match for ongoing expenses.

This question was disappointingly handled with few students showing any real understanding of unit linked products. Part i required students to consider setting surrender penalties which are usually entirely transparent in a unit-linked product. Part ii required a simple overview of the model not a detailed discussion on the model points or how the model would be parameterised. Part iii required application of the generic list in the core reading to the structures described.

QUESTION 6

Brokers are incentivized to sell risk as opposed to savings policies

Brokers will start to favour risk business generally which will have a positive impact on risk business volumes

The change reduces the initial cashflow for brokers resulting in a poor match for their expenses.

Thus some brokers may leave the market entirely...

Resulting in lower new business volumes for both risk and savings

Impact on risk insurer

Risk products still incur high New Business Strain due to the upfront commission

And hence new business strain should increase due to higher volumes

This will result in a need for more capital...

... and will also result in a decrease in the solvency strength at the next valuation

However, if brokers are trying to restore their revenue levels, they may oversell risk products resulting in poor persistency

And misspelling resulting in reputational risk

Impact on savings insurer

New business strain will decrease because of regular commission...

And due to lower volumes

Hence the solvency position may improve with the effect visible at the next valuation

The lower volumes may jeopardise fixed expense recovery

Persistency will improve due to the incentive to churn being removed...

... which would improve profitability in the long run

The new commission structure results in the products being less capital intensive

This question was poorly answered by many students. Very few (if any) referred to the fact that some brokers might leave the market due to expenses not being matched. Many did not think that risk insurer will be influenced because commission structure didn't change on risk side.

QUESTION 7

i

- The reserves should cover all liabilities arising from all contracts
- Reserves should be calculated prudently, allowing for all relevant liabilities
- Including: guaranteed benefits, guaranteed surrender values, guaranteed bonuses, options available to policyholder, future bonuses of all kinds, taking into account PRE, expenses (incl commission)
- Reserves should take credit for future premiums if these are contractually due to be paid
- Valuation should be prudent, not best estimate, and so the basis should contain margins
- Valuation of liabilities should be consistent with assets (or should take account of the nature, term and method of valuation of the corresponding assets)
- Appropriate approximations and generalisations may be allowed
- Interest rate used for calculating reserves should be chosen prudently, taking into account the currencies, yields and reinvestment yields on the assets
- Elements of the statistical basis, that is the demographic, withdrawal assumptions and expense assumptions, should be chosen prudently, having regard to type of insurance, country where insured people live, but expenses can be on an ongoing business basis
- Where no explicit allowance is made for future bonuses, they must be allowed for implicitly by a suitable adjustment to the valuation interest rate
- If valuation method itself defines the amount of expenses assumed (eg net premium method), then the amount implied must be no less than a prudent estimate of the relevant expenses
- Method of calculation of reserves from year to year should be such as to recognise profit in an appropriate way over the duration of each policy
- Valuation calculations conducted over time should not suffer discontinuities arising from arbitrary changes to the basis
- Valuation methods and bases should be disclosed
- The reserve should not be less than any surrender value payable, whether or not it was guaranteed

Prudence

The net premium is suitably prudent:

Guaranteed benefits (initial sum assured plus bonuses to date) are valued directly (*must specify what constitutes guaranteed benefits*)

But the net premium method would not allow for cost of options and so an additional reserve would be needed

Future premiums are valued

Future bonuses

Allowance is made through a reduction to the valuation rate of interest

The difference between the office and net premium may include a margin for future bonuses

Terminal bonus is not reserved for explicitly

The method is used with a book value of assets, so that investment appreciation is taken into an investment reserve, and is not brought into the comparison between assets and liabilities when surplus is determined.

Expenses

The margin between the office and net premium allows for expenses

A Zillmer adjustment may be used to allow for initial expenses

Though being implicit, the expense allowance may not be adequate, in which case an additional reserve would be held, or the net premium restricted to a maximum % of the office premium

Other

A prudent mortality basis is used, set by reference to current and expected future experience

The valuation rate used is related to the yield on assets

The method produces a smooth emergence of profit, if used in conjunction with assets valued at book value

The net premium method and basis are simple to describe for disclosure purposes

Method doesn't capitalise profit margins in the future gross premiums

Reserves are relatively insensitive to changes in the valuation basis because net premium changes if valuation basis change

Makes use of approximations and generalisations eg bonuses and expenses approximated

A portfolio of fixed interest stock/bonds would match the annuity

Call option

The current cost of call options on such a bond portfolio could be used

Strike date is the policy maturity date

So if interest rates reduce below the implied guaranteed rate, the increased cost to the company of providing the guarantee is offset by an increase in the value of the call option

Hence the value of the call option represents the expected cost of the annuity guarantee provided by the company

Put option

Or use a put on an interest rate

So if interest rates reduce below the implied guaranteed rate, the increased cost to the company of providing the guarantee is offset by an increase in the value of the put option.

This is a market-consistent approach to liability valuation and hence market values of assets would need to be adopted.

Part i was well answered by students who knew their bookwork.

Part ii was not well answered. Very few people mentioned the fact that method is used with book value of assets. Some students explained whether principles were met for non-profit business, which was not required in the question.

Part iii was poorly answered. Many students suggested that company should purchase these assets, instead of reading that it is a reserving strategy, not an asset-liability matching strategy.

END OF EXAMINERS' REPORT