Actuarial Society of India

Examinations

November 2006

SA2 –Life Insurance Specialist Applications

Indicative Solution

1. An Indian life insurance company commenced operations five years ago selling both traditional reversionary bonus endowment contracts and unit linked regular and single premium contracts. The company's market efforts have been very successful and the company has posted very strong sales results and high growth rates.

The company originally planned to eliminate expense overruns within five years but has not succeeded and actual expenses are about double the expense allowances in the premium basis. As a result, the projected capital requirements are about equal to the projected expense overruns.

The shareholders are now having difficulty in raising the required capital and have asked what the company's options are if no further capital is forthcoming.

Your projections show that if the company continues with the current business plan the minimum solvency margin will be breached within 12 months.

a) Describe how you would use the analysis of surplus to explain sources of consumption of capital.

ANSWER:
Candidates should relate the analysis of surplus to *capital consumption*. It is important to recognise that the treatment of analysis of surplus in the study notes refers primarily to the outworking of the policy mathematical reserves. Solvency and resilience reserves which are only indirectly related to the valuation assumptions require separate treatment.

It helps to recall the requirements for capital:

- ? Fund new business
- ? Invest more freely
- ? Fund overheads and developmental costs (applies particularly to a new company)
- ? Acquire other companies and businesses
- ? Support with profits bonuses and bonus smoothing
- ? Solvency valuation requirements
- ? Other risks
  - o policy guarantees
  - o with profits growth guarantees
  - o investment risks, both as to capital and interest
  - o credit and counterparty
  - o persistency
  - o operational risks, systems etc
  - o mortality and morbidity

The examiners will accept answers based on either the formulae approach or the cash flow approach.

- ? from the details given in question, we would expect the major causes of capital consumption will be expense overruns and new business strain from the high rates of growth
- ? analysis of surplus is the explanation of how the surplus at the beginning of the year changes to surplus at the end of the year
- ? surplus is the excess of assets over liabilities
- ? the change in surplus occurs because
  - i) the actual experience differs from that expected on the valuation basis

- o change in valuation basis
- o interest
- o expenses (usually only renewal)
- o mortality
- o lapses
- o actual vs expected charges for unit linked
- o tax

ii) other cash flows and variables which do not form part of the valuation basis
- o interest on surplus
- o change in solvency reserves
- o change in resilience reserves
- o shareholder transfers (in or out)
- o bonus loadings versus actual cost of bonus
- o new business
- o product mix

? need to decide on the method (formulae usually used for traditional business, while cashflow may be more suited to unit linked and other complex products) and procedure (direction and order of calculations)

Formulae method:

Interest:	$I - iV_0 - i/2(P - E - C)$
Expenses:	$(E' - RE)(1+i/2)$
Mortality:	$ADS - EDS$
	$ADS = q(S - V_0 (1+i/2))$
	$EDS = (D + P'')(1+i/2) - V_1^D$
Withdrawals:	$V_0^W (1+i) + (P^W - W)(1+i/2) - EDS^W$
New business:	$(P^N - E^N)(1+i/2) - EDS^N - V_1^N$

Cash flow method:
- ? set assets equal to liabilities at start of the year
- ? project liabilities at the end of the year on the valuation assumptions for expected experience
- ? recalculate the year end liabilities changing one valuation assumption to the actual experience
- ? the resulting change in surplus is the contribution for that item of experience
- ? repeat, changing one assumption at a time to the actual experience

For both methods:
- ? change in solvency margins
- ? change in resilience reserves

b) State the obligations on the appointed actuary these circumstances, and list the warning signs that would be apparent to the regulator as the company's solvency margin falls.

ANSWER:

The appointed actuary's obligations are detailed in GN1 (especially paragraphs 1 and 4) :and the IRDA (Appointedx Actuary) Regulations, 2000 (especially paragraph 8(i)).

- ? ensure that the company is run on sound financial lines and with regard to policyholder reasonable expectations

- ? appraise board and management of situation and make sure that they understand the the implications and consequences
- ? require the board to agree to a satisfactory plan which will safeguard solvency
- ? if a satisfactory plan is not forthcoming, or if there is no feasible corse of action to protect solvency and policyholder interests, then the appointed actuary must report the situation to the IRDA
- ? ensure that new policyholders are not mislead with regard to their expectations

Warning signs for the regulator:

- ? Concerns expressed by the appointed actuary, either formally or informally
- ? Amount of free surplus in excess of required minimum solvency margin at last 31 March reporting date
- ? Expenses for year to the last 31 March reporting date
- ? Surplus relative to expenses gives a rough indication of the timing of future capital requirements
- ? Reserves held in the event of cessation of new business under GN1 and as described in the Actuarial report and Abstract
- ? Marked change in reinsurance arrangements or volumes
- ? Unexplained weakening of valuation basis
- ? Unexplained changes in strategy
- ? Press reports
- ? Market intelligence
- ? Closure of branches, or reduction in agent recruiting
- ? Reduced advertising exposure
- ? Rise in the level of olicyholder complaints

c) Discuss the options available to the company and the actions it will need to take to avoid insolvency.

ANSWER:

The question asks candidates to *discuss*. A single word will only earn ½ a mark, for a full mark there must be a brief description.

New sources of capital:

- ? the shareholders could seek to sell the entire company to a new promoter
- ? identify a new promoter to take up a share of the company and who will introduce additional capital
- ? float of existing shares or new additional shares to public via IPO to raise further capital
- ? merge with another insurance company, with our shareholders trading their shares for shares in the merged company
- ? subordinated loan (not currently allowed under Indian regulations)
- ? reinsurance – the liability for upto 50% of group sums at risk and 15% of individual sums at risk can be transferred to a reinsurer for which the reinsurer will pay an initial commission as well as freeing up the solvency margin

Conserve and release existing capital:

The following steps will conserve or release existing capital but unless very drastic may only postpone the need for additional capital.

- ? manage product mix in favour of products with lower capital requirements (traditional business often has zero reserves in the first year, cut out risk riders with their requirement for Rs 3‰ solvency margin)
- ? reassess strategic business direction
  - o curtail branch expansion and agent recruitment
- ? channel management
  - o redirect distribution activity in favour of more productive or lower cost channels such as bancassurance
  - o reassess sales incentive programs
- ? expense management
  - o tight control on budgets (travel, recruitment, advertising)
  - o cancel new initiatives e.g. computer systems
  - o staff rationalisation
  - o branch rationalisation
  - o premises rationalisation
- ? bonus strategy and smoothing
  - o consider reducing bonuses
  - o change from simple bonuses to compound bonuses which can defer liability for declared bonuses
  - o increase the proportion of terminal bonus and reduce the proportion of reversionary bonus
  - o reduce the level of smoothing for both reversionary and terminal bonuses
- ? asset liability matching – careful matching or even a switch out of equities to debt for non linked business can reduce the need for resilience reserves
- ? manage inadmissible assets defined in the IRDA (Assets, Liabilities, and Solvency Margin of Insurers) Regulations, 2000 – it may be possible to reduce debtors, convert fixed assets by sale and leaseback etc.
- ? release margins in valuation basis – the MADs may be excessive, refining approximations may release reserves (but of course these might backfire and require additional reserves!)
- ? release conservative accounting provisions
- ? of course, there should be no transfers to shareholders or payment of dividends

d) Discuss the risks the company will have to manage in implementing the options you have identified.

ANSWER:
The question asks candidates to *discuss* the risks. Elaboration on how the risk arises is required to get a full mark.

- ? a major risk with trying to raise new capital is that this has a long lead time and quite a low rate of success
- ? reputation will suffer as the it becomes known that the company has a low solvency margin, ratings agencies will lower their ratings and customer confidence will diminish
- ? poor publicity will make sales harder
- ? staff morale will reduce and turnover increase as expenses are cut and as new business activity becomes more difficult
- ? agent productivity and retention will suffer as competitors products become relatively more attractive and easier to sell
- ? persistency – lapses and surrenders- will suffer as the financial strength of the company reduces

- ? there is a risk of regulatory intervention together with the restrictions that may be imposed and the management time that this will require
- ? lost opportunity and loss of market share because of insufficient capital to fund growth
- ? less capital ? less investment freedom ? lower investment returns ? harder to attract/retain customers ? less retained earnings ? less capital and a downward spiral
- ? not meeting PRE eg through lower bonus rates

e) Discuss how the change in strategy required to maintain solvency might effect policyholders' reasonable expectations.

ANSWER:
Again, the question asks candidates to *discuss*.

If customers were aware and fully informed they would have expectations about:

- ? asset allocation with the implications for risk, investment returns and bonus rates
- ? expense structure of the company as a growing entity with increasing economies of scale
- ? development and innovation from a growing company instead of the curtailed activity of a company restrained by capital requirements
- ? levels of customer service which would be impacted by expense cuts
- ? prospects for financial strength and solvency are now quite different since the shareholders have realised that they are unwilling to invest more capital

[Total Q1 50]

2. An established Indian life insurance company has been selling unit linked regular and single premium business largely through the banking operations of its major shareholder, but also through a small but productive agency force active in the middle income market segment.

The company has been experiencing difficulty in meeting its rural obligations under the legislation and it is now seeking to develop its rural business, both to meet its obligations but also to pursue the rural market as a profitable one in its own right.

To meet these objectives the marketing manager has proposed two new products:

- ? A simple reversionary bonus endowment insurance with a term of 10 years with a sum assured of Rs 50,000 payable on death or maturity, as well as payments of Rs 5,000 in the event of serious accident requiring hospitalization.

- ? A unit linked regular premium savings plan with a guaranteed minimum return of 5% pa packaged with a critical illness benefit. This product is offered for terms from 10 to 20 years with a minimum annual premium of Rs 25,000.

a) List the factors that need to be taken into account in designing suitable products for the rural sector and state whether the proposed products satisfy these factors.

ANSWER:

Candidates should show that they understand the needs of the customer and the sometimes conflicting objective of the insurer, and consider the purposes, benefits and risks to the policyholder and the insurer.

Factors to be taken into account for rural areas:

- products that are simple to explain and simple to understand
- smoothed investment returns are attractive
- easy underwriting, few medical facilities
- affordable premiums
- flexibility to meet fluctuating incomes
- fair rate of return compared to alternative investments such as bank and post office deposits
- provides meaningful insurance against death and health risks
- limited servicing by the life insurance company
- limited medical services for underwriting and claims management

Traditional endowment product

- The reversionary bonus system is simple and superficially well understood (although most customers would have a very fuzzy idea about how the bonus rates are actually determined).
- Smoothing of investment returns through the bonus rates will be attractive to the relatively unsophisticated rural market.
- The small policy size of around Rs 5,000 annual premium will be acceptable in a rural context, although the inflexible regular annual premiums may be onerous in years when crop yields are pure.
- A surrender value is probably not available unless 3 full years premium have been paid, and the SVs are probably low. This also makes the product less than flexible.
- The low sum insured of Rs 50,000 and the fact that the hospital benefit is for accident only means that only limited underwriting will be required which is a benefit in the rural context where medical facilities and availability may be limited.
- From the insurer's point of view, the product needs to be priced at a level similar to the rest of the traditional portfolio to prevent cross subsidies. This may be difficult to achieve as the small policy size may not cover all expenses fully.
- The hospital cash benefit should be attractive as there are not many health cover options available.
- Suitable data for pricing the hospital cash benefit may not be available.

Unit linked product

- The minimum annual premium of Rs 25,000 is very high in a rural context. Perhaps this should have been a single premium product.
- There is some doubt as to the general suitability of unit linked products in the relatively unsophisticated rural market.
- The 5% guarantee is very attractive, although it is likely to be onerous to the insurer.
- The CI benefit could lead to problems with underwriting, claims verification and policyholder dissatisfaction because of the limited number of conditions and the exclusion.
- There is potential with the unit linked design to give the product some flexibility, especially with premium payments, which will be attractive in the rural areas with fluctuating incomes.

- ? The requirements of the ULIP guidelines will however limit complete flexibility.
- ? No policy loans are allowed for unit linked policies, and there is a three year lock in period which means that the policy cannot be used as a temporary source of finance.
- ? With the high minimum premium, will the product really be sold in rural areas? The company will be at risk of not meeting its rural obligations.

b) State how these products can be made more tax efficient.
The fact that this is a rural product does not remove the need for tax efficiency. There are rural customers who are taxpayers, or will be taxpayers one day, and customers will expect to be able to claim any applicable tax advantages.

The following features should be integrated with the product design:

- ? Check that the sum insured is always at least 5 times the annual premium to qualify for the premium rebate under Sec 88 and for the tax free treatment of benefits under Sec 10(10D)
- ? Unbundle the premium for the cash hospital benefit with the first product so that this can qualify under Sec 80D
- ? Make the CI benefit as additional benefit (as opposed to acceleration benefit) so that the CI premium qualifies under S.80(D)

c) Outline the professional guidance relating to the role of the Appointed Actuary in connection with premium rates and policy conditions for new products and existing products currently on sale.

ANSWER:
Paragraph 6 of GN1 sets out these considerations.

“6. **Premium rates and policy conditions for new products and existing products on sale**

6.1. The Appointed Actuary must be satisfied that premium rates for new business are appropriate, that is to say sufficient in due course to enable the company to meet its liabilities. If future new business is being written on inadequate terms, it will require support from the free assets in the shareholders fund, the Appointed Actuary should consider the company's ability to continue to write new business in the context of how much capital is required and should inform the Board of Directors accordingly.

6.2. Whether the premium rates are appropriate is a probability statement and hence the Appointed Actuary must exercise judgement. This judgement needs to be based on the use of sound techniques and the Appointed Actuary must specifically consider;

a) the impact of taxation
b) the adequacy of the provision for expenses
c) the existence of any options, including guaranteed surrender values, and the risk that financial conditions could be such that a policyholder could gain by surrender and re-entry.

6.3. If the contract is likely to give rise to significant new business strain then the Appointed Actuary must be satisfied that the company can set up the necessary reserves. If need be, he/she should indicate limits on the volume of sales that may prudently be accepted and/or how much capital is required and gain reassurance from the Board of Directors that the required level of capital will be available and not earmarked for other purposes. For this purpose the Appointed Actuary will take into account the shareholders' assets, however, it cannot automatically be assumed that they are equivalent to free reserves held as part of the policyholders' fund because they can be used for other than life insurance business.

6.4. For linked business, including unitised with profit business the Appointed Actuary must be satisfied that all discretionary elements of unit pricing and fund charges are applied consistently with policyholders' reasonable expectations. In addition, the Appointed Actuary must be satisfied that the procedures for determining
(a) the prices at which units are allocated to or de-allocated from policies;
(b) the prices at which units are created or cancelled; and
(c) compensation where errors of a material size in unit pricing or in the allocation or de-allocation of units to policies have occurred:
are equitable to any policyholders affected either directly or indirectly. For these purposes the Appointed Actuary must have regard, inter alia, to the tax position of the business and to the expected future growth or decline of the particular fund, if any."

During the first 6 months after launch of the products, the company finds that about 5% of its regular premiums are being received from the first new product and about 75% from the second new product.

d) Discuss the impact of introducing the two new products on the capital requirements of the company.

ANSWER:

- ? This is a very significant bias in the new business product mix, although based on average premiums of Rs 5,000 and Rs 25,000 respectively, the mix by *number* of policies will be much less skewed.
- ? It is assumed that the two products are priced for equivalent levels of profitability and that both give the required yield on capital.
- ? The capital implications are substantial. The statutory reserve for the traditional endowment product in the first year may well be negative, and then eliminated to zero.
- ? The reserve for the unit linked product will be at least the allocation amount accumulated with 5% interest.
- ? Furthermore, the capital guarantee under the linked product will require resilience reserves which will not be trivial.
- ? Rupee for rupee, the new business strain for the unit linked product will be much higher than the endowment product.
- ? The costs associated with servicing and maintaining unit linked products are often underestimated because of their complexity, and so there may be significant cost overruns for the unit linked product.

The Finance Director has suggested that as the company incurs high costs at the point of sale, the company should take credit for some part of these as 'Deferred Acquisition Costs'.

e) Discuss whether and how you would quantify any 'Deferred Acquisition Cost' in respect of the two new products.

ANSWER:

- ? A "Deferred Acquisition Cost" is a balance sheet asset representing the amount of acquisition costs which are to be recovered from future premiums.

- ? The object of the DAC is to spread high initial expenses over the life of the policy so that profit reported in the first year is not a big negative number.
- ? DAC is not an option under the Indian regulations.
- ? Traditional business is valued using a gross premium valuation method. Because the gross premium already contains an allowance for recouping the initial expenses, it is not appropriate to have a DAC in addition.
- ? The regulations however prohibit negative reserves, so that effectively the extent to which initial costs can be amortised is limited.
- ? For unit linked business, initial costs and particularly commission are reflected in high allocation charges and lower reserves in the first year. To some extent at least, the initial costs have already been recouped and there is a reduced need for a DAC.
- ? If we designed a unit linked product with level charges, then the position would be different and it would be desirable to hold a DAC for the purpose of profit reporting. However this is not an option under the regulations.
- ? For the purpose of internal management profit reporting, the company could consider producing management accounts using best estimate assumptions, and with a DAC for that part of acquisition costs which are not already recognised in the statutory reserves.

f) Describe how the company should manage the guarantees in the second product.

ANSWER:

- ? This guarantee is a difficult one to manage because the reinvestment risk is aggravated by the flow of future premiums as compared to a single premium product.
- ? The question does not say whether the guarantee return applies to the gross premiums paid (which is quite onerous) or to the premiums net of charges.
- ? The product will be complex to manage because every customer will have a unique mix of units bought at different times and at different prices, yet every customer has the same 5% guaranteed earning rate.
- ? The product cannot allow the individual policyholder any choice of investment funds as any equity exposure increases the cost of the guarantee substantially and the company needs to retain full control of the asset allocation to manage the risk.
- ? Derivative protection is not currently available under the regulations in India, but in any case is only of limited help because the terms applying to future premiums remains unknown.
- ? Capital support in the form of resilience reserves will be essential to provide against a sustained fall in interest rates.
- ? The company's strategy would have to be to invest the first four or five years premiums entirely in debt , hoping that interest rates will remain high enough to lock in the sums insured.
- ? Once the sums insured are locked in, resilience reserves will be reduced and a portion of the remaining premiums may be exposed to equity hoping to achieve an overall earning rate higher than 5%.
- ? There will be a minimum current yield, say 7%, on government bonds coupled with a minimum future rate, say 5% after three years, below which the guarantee will not be viable. If interest rates fall below these levels, then the guarantee will have to be reduced for new business.

g) List the items of cash flows, mentioned in IRDA (Assets, Liabilities and Solvency Margin of Insurers) Regulations, 2000 that are to be discounted while using the gross premium method of valuation for the conventional endowment insurance product, and explain the implication of these regulations for shareholder profits.

ANSWER:

Paragraph 3 of the ALSM regulations sets out these:

"**Policy Cash Flows** .--- The gross premium method of valuation shall discount the following future policy cash flows at an appropriate rate of interest,---

(a) premiums payable, if any, benefits payable, if any, on death; benefits payable, if any, on survival; benefits payable, if any, on voluntary termination of contract, and the following, if any, :-
   (i) basic benefits,
   (ii) rider benefits,
   (iii) bonuses that have already been vested as at the valuation date,
   (iv) bonuses as a result of the valuation at the valuation date, and
   (v) future bonuses (one year after valuation date) including terminal bonuses (consistent with the valuation rate of interest);

(b) commission and remuneration payable, if any, in respect of a policy (This shall be based on the current practice of the insurer). No allowance shall be made for non-payment of commissions in respect of the orphaned policies;

(c) policy maintenance expenses, if any, in respect of a policy, as provided under sub-para (4) of para 5;

(d) allocation of profit to shareholders, if any, where there is a specified relationship between profits attributable to shareholders and the bonus rates declared for policyholders.

Provided that allowance must be made for tax, if any."

Item (d) requires that in respect of par business, future allocation to shareholders to be taken as cash flow i.e.included in the reserves. The value of this item would reduce over time releasing expected shareholder transfers every year. This ensures that planned profits emerge over the term of the policy and not at the outset. The absence of this provision would mean that the entire expected future shareholder cash flows could be released at any time. However in respect of non-par business this provision does not apply and hence the emergence of planned profits could be managed by the company.

[Total Q2 50]

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