

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

April 2015 examinations

Subject SA2 – Life Insurance Specialist Applications

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 at the date the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

F Layton
Chairman of the Board of Examiners

July 2015

General comments on Subject SA2

The Examiners' Report covers more points than would be expected to get full marks. This is so that alternative approaches to questions by different candidates can be accommodated within the marking scheme. Whilst candidates are expected to show knowledge of the relevant content of the Core Reading, it is much more important in this exam to tailor answers and apply that knowledge to the specifics of the question than it is in earlier exams.

Comments on the April 2015 paper

Both questions included sections on the impacts that Solvency II might have on existing processes. This required an understanding of the Core Reading on both the process in question and Solvency II. Candidates had to then combine these areas of knowledge and apply them to the questions.

Candidates approaching the subject should use this Report, and previous Examiners' Reports, to practice the application of knowledge.

- 1** (i) **Mathematical reserves**
Using prospective actuarial valuation
on prudent assumptions
Present value of future annuity payments and expenses
Discounted at a valuation rate of interest which cannot exceed 97.5% of the
risk-adjusted yields on the backing assets
Long Term Insurance Capital Requirement (LTICR)
Multiply defined measure of 'capital at risk' (e.g. mathematical reserves) by
fixed percentage
Unclear on whether realistic or regulatory, though there is no mention of with
profits business being written so appears to be regulatory
If regulatory also hold **Resilience Capital Requirement (RCR)**
Assessment of market risk based on combination of prescribed shocks
To equity values, property values and fixed interest yields
LTICR and RCR added together forms the **Minimum Capital Requirement**
(MCR)
MCR is subject to a minimum of the **Base Capital Resources Requirement**
(BCRR)
Fixed amount defined in EU directive, e.g. €3.7m for year end 2013.

Well prepared candidates were able to score highly.

- (ii) Longevity risk
Immediate annuities only
- Persistency risk
Unit-linked pensions only
- Expense risk
Both annuities and pensions
- Operational risk
Both annuities and pensions
- Credit/counterparty risk
Annuities only / Both
- Market risk
Pensions only / Both (if include interest rate risk)

[Under "market risk" the marks were alternatively given for interest rate risk (annuities only or both) or equity market risk (pensions only) – but not for both. Marks were awarded for insurance risk (both products) instead of awarding the longevity and persistency risk marks.]

Well prepared candidates were able to score highly.

(iii) **Persistency and expense**

Positive correlation between expense levels and number of transfers

[This could also be described as a negative correlation between expenses and persistency.]

As increased transfers reduces the number of policies and so increases the per policy expenses...

... to the extent that the modelled per policy expenses reflect fixed costs

Also, at the extreme, increased transfers may require additional processing resource and so increase expenses

Operational and persistency

Positive correlation between operational risk events and number of transfers

As operational risk events could cause reputational risk or policyholder dissatisfaction and so result in increased transfers

In addition, management may be distracted by operational problems leading to a lack of focus on the business which in turn leads to transfers

High levels of transfers could also cause operational disruption e.g. if unable to cope with the processing

Longevity and credit

Positive correlation between lives living longer and default events

As reinsurers taking on longevity risk have a higher risk of default if longevity increases.

Similarly for longevity swap counterparties.

Companies which have issued debt may be more likely to default on it in situations where pension scheme costs or deficits have increased significantly due to longevity.

Persistency and market

Positive correlation between poor investment market performance and number of transfers

[This could also be described as a negative correlation between good investment market performance and number of transfers, or a negative correlation between poor investment market performance and persistency, or a positive correlation between good investment market performance and persistency.]

If market values reduce then generally expect persistency to worsen for unit-linked business

As policyholders become nervous about maintaining their investment in volatile assets

However, pensions have the restriction that monies can only be transferred to another provider before age 55 rather than money going out to the customer

Therefore withdrawal risk is mainly a risk on post-retirement age pensions

But paid-up rates could increase at the same time as market performance is poor

E.g. due to inability to maintain premium rates during an economic downturn

Market and credit

Positive correlation between poor investment market performance and number of defaults

[This could also be described as a negative correlation between good investment market performance and number of defaults.]

If investment market performance is poor then would expect more companies to be experiencing financial difficulties
And so increased risk of defaults

Expense and market

Positive correlation between poor investment market performance and expense levels

[This could also be described as a negative correlation between good investment market performance and level of expenses.]

Lower market levels give lower funds on unit-linked pensions and so less assets to spread fixed investment expenses over

Operational and expense

Positive correlation between operational risk events and expense levels
As operational risk events could generate additional costs due to the need to rectify the situation

There could be a small correlation between the following:

Operational and market (e.g. floods hitting operations and adversely impacting market sentiment) - positive

Longevity and operational (e.g. 'flu/Ebola reducing longevity but increasing business disruption) – negative.

Credit and persistency (e.g. more lapses if credit spreads widen) – positive.

Credit and operational (e.g. default of outsourcer having negative impact on operations) – positive.

Longevity and market (e.g. pressure on gilt yields as demand increases, companies with pension scheme risk issuing bonds) – positive.

Credit and expenses (e.g. failure of an outsource provider) - positive

Longevity and expenses – similar to persistency and expense

[Marks were awarded for any reasonable and well-argued answers. If candidates stated different risk types in part (ii), even if these gained no marks in part (ii) credit was given here for reasonable correlations of those risks with the other risk types (with reasons).]

Candidates were able, in most cases, to highlight the appropriate correlations. Those that gave relevant and thorough rationales scored highly.

- (iv) The purpose of the deposit back is that insurer has enough assets to cover capital requirements should the reinsurer default.
- (v) The deposit back is specified as 101% of Pillar 1 Peak 1 and so 1% difference is expected.

The insurer and reinsurer may be using a different mortality basis.

This may be due to having a different size of portfolio on which to analyse experience.

Or a genuinely different view on base mortality...

... or on future improvements.

One may model improvements stochastically, the other may model them deterministically.

The reinsurer may have a more sophisticated and granular approach to setting the mortality basis.

They may be using a different discount rate (for example, different yield curves).

This may be due to having a different view of the yield on the assets in the deposit back.

Perhaps due to a different allowance for default risk,
or reinvestment risk,

or asset value due to variable redemption dates etc.

They may be using a different expense assumption.

This may be due to different levels of efficiency.

Or a different size of total business over which to spread overheads.

They may be using a different future expense inflation assumption.

They may be including a different allowance for prudence.

This may be due to having different portfolio sizes,

One company might have more experience,

Or more diversification,

Or different risk appetites,

Or a genuinely different view on possible experience volatility.

There may be different allowances for tax if the reinsurer operates in a different jurisdiction.

Different data might be being used in the two calculations.

e.g. extracted as at a different date.

The reinsurer may be using model points as opposed to policy by policy.

The reinsurer may use a simplified approach.

The unexplained difference could be due to an error.

This question gave candidates the opportunity to apply knowledge to a specified scenario and was very well answered by many.

- (vi) Pillar 1 (of Solvency II) is the new basis on which the amount will need to be determined
Technical provisions are likely to be the starting point for the deposit back
Technical provisions should represent the amount the company would have to pay in order to transfer its obligations immediately to another insurance company
And so could be a good proxy for the cost of a replacement reinsurance contract
Technical provisions are the best estimate liability (BEL)...
... plus risk margin

If only the BEL were used, there would likely be a material drop in the deposit back and this would be unacceptable to the company.
Therefore it is likely that the risk margin would also be included. This compensates for the risk being taken on.

However, the SCR would not be included...
...because under the current regime, the arrangement is related to prudent reserves, not capital requirements.

Consideration needs to be given to how the risk margin should be calculated
Calculating it accurately and fully each month would be complicated...
... and time consuming
Particularly allowing for projection of capital requirements in run-off
And correlations between risks

The ability for the reinsurer to do this easily depends on whether they are reporting on a Solvency II basis or not
And, if they are calculating on a Solvency II basis, whether that is on a internal model or standard formula basis

An alternative is to calculate the risk margin element approximately
For example as a percentage of best estimate liabilities
This would be simpler to calculate
But it assumes that capital in respect of each risk moves in line with best estimate liabilities
Could use a slightly more sophisticated approach based on a small number of relevant drivers
Different drivers are needed for different risk factors
e.g. expenses may need to use policy count as a driver
Agreeing a suitable percentage (or percentages) could be difficult
Would want stability over time
But also adequate coverage of the risks
Modelled data (i.e. model points) could be used rather than policy by policy.
The approach to correlations and aggregation could be simplified.

Could base the percentage on the insurer's full risk margin calculation at outset

But the reinsurer might not agree with the assumptions made by the insurer
Similarly, differing underlying modelled SCRs will impact the risk margin.

Currently the deposit back is calculated as 101% of reserves for additional protection, so consideration should be given to whether this 1% uplift is still a suitable loading for protection

The assumptions to calculate the best estimate liability would still need to be agreed

Or set by the reinsurer and subject to challenge

But no margins for prudence should be included in these assumptions

There may be a different approach to the matching adjustment.

It is possible that the reinsurer may calculate the deposit back fully on a quarterly basis and perform an approximate roll-forward for intermediate months...

... e.g. adjusted for policy movements...

... and any material changes to factors underlying assumptions e.g. interest rates

The highest marks were achieved by candidates who recognised both the technical issues and the practical difficulties, and demonstrated good understanding of the Solvency II balance sheet components as described in the Core Reading.

- (vii) Under Solvency II reporting regulations, reinsurance will now have to be shown as an asset on the balance sheet ...
... rather than as a reduction in liabilities

Assets allowed in the deposit back may be different

Solvency II asset requirements are more similar to Pillar 1 Peak 2 rather than Peak 1

E.g. there are no admissibility limits...

... so a higher proportion of each asset may be allowed

And under Solvency II, assets must be valued at market value

This may also impact the determination of assets which are included in the deposit back, if some of those assets were not previously valued at market value

The insurer may be looking to apply a reduction to the risk-free discount rate to allow for a matching adjustment

Restrictions might be put on the assets in the deposit back in order to qualify to get this adjustment

A greater level of disclosure may be required.

The wording of the treaty may require alteration.
The counterparty risk capital may change.

Most candidates commented that reinsurance is treated as an asset under Solvency II, but few candidates went further.

- 2 (i) The Solvency II rules require the best estimate liability (BEL) to be calculated on best estimate assumptions.
Therefore there are no margins in the mortality or expense experience assumptions to be released into profit.
So it is appropriate that there is no present value of future profits...
... in respect of mortality and expenses.

Investment return and discount rate assumptions used for both MCEV and Solvency II are based on risk-free rates.

In which case there would also be no profit arising on investment experience that needs to be allowed for, ...

so it is appropriate that there is no VIF in respect of this element.

However, under Solvency II the company may be making use of either the matching adjustment...

... or volatility adjustment.

And under the MCEV a "liquidity premium" may be allowed for.

If these allowances and adjustments are the same under the two approaches, then there will be no emergence of future profits (or losses).

However, if there is a difference then a small additional present value of future profits (or losses) could arise and might have been expected to be included in the calculation.

In which case it would not be appropriate to ignore VIF in the calculation.

Future profits can only be taken credit for up to any contract boundaries under Solvency II

So the company might wish to hold an element of VIF in relation to future profits arising beyond such boundaries, if they apply.

The release of the RM could be considered as an element of VIF.

Most candidates recognised that the use of best estimates meant that there would no longer be the future releases of valuation surpluses that make up the VIF. However, only the better candidates commented on the areas of prudence within the Solvency II technical provisions, as are described in the Core Reading.

- (ii) Opening Embedded Value
Expected return on free surplus
Return on in-force business
Expected return on value of in-force
Experience variances

Operating assumption changes
New business contribution
Development costs
Operating return before tax and exceptional items
Investment return variances
Effect of currency movements
Effect of economic assumption changes
Exceptional items
Return on EV before tax
Attributed tax
Return on EV after tax
Capital raised
Less Capital distributed
Closing Embedded Value

Generally well answered.

- (iii) One method that could be used to analyse the experience variances would be the projection approach:
- Assets are allocated to the contracts equal to the value of the BEL at the beginning of the year;
 - The assets and BEL are projected forward to the end of the year...
 - ... using the beginning of the year BEL assumptions as the expected experience over the year;
 - The profit emerging during the year is then determined as the difference between year end assets and BEL;
 - For the first step (i.e. all experience items taken their expected value) the profit emerging will be zero;
 - Repeat the above projection of assets, liabilities and profit, changing one of the items of experience from the expected value to its actual value;
 - The difference in the profit (or surplus) arising under the runs gives the contribution from that item of experience;
 - Repeat for each item of experience.

The results depend on the order in which the items are considered...
... so maintaining consistency year on year is important.

This was well answered by candidates who applied the Core Reading appropriately to the specific scenario given in the question.

- (iv) Expected return on free surplus would use the same basic approach as currently
i.e. the risk-free investment return assumption earned on the free surplus.
But the value of the free surplus will be different now.

There will now be no expected return on the value of in-force since the embedded value does not allow for any VIF.

Although there may be an “unwind of the discount rate” component in respect of the release of the RM and SCR (*or equivalently on the “cost of capital” component in respect of the RM and SCR*).

The experience variance analysis approach of changing each item in turn will be the same (as described in part (iii))

But there will no longer be any need to determine the experience variance impact on the value of future profits.

Experience variances will now emerge as the difference between the actual cashflows arising during the year and the expected cashflows based on the assumptions underlying the BEL rather than those based on the embedded value experience projection basis...

... although these bases may in practice be the same.

Experience variances will also now emerge as the impact on the BEL of different experience to expected.

An experience variance item may also be required for any difference in the actual release of capital to that expected.

Depending on the materiality of this item the company may include it in the above step, or it may determine it separately.

This may also have been the case for the previous MCEV approach.

Operating assumption changes will now emerge into profit if the BEL assumptions have changed.

The approach taken to the analysis of such changes will be similar to the analysis of changes in reserving assumptions at present.

As there is no VIF, there will no longer be separate operating assumption changes to consider for the experience (projection) basis.

Assumptions underlying the risk margin or capital requirement calculations might also change (e.g. correlation coefficients or calibration of risk), which could also impact the embedded value.

The assumed “cost of capital” factor might also change (i.e. parameters used to determine the cost of holding the RM and SCR), the impact of which would also need to be analysed.

This may also have been the case for the previous MCEV, if such a parameter was used to determine the cost of holding any required capital.

Allowance for the year's new business is essentially the same.

The new business contribution may at present be calculated by assessing the new business strain plus present value of future profits arising at point of sale. It could now be assessed by simply taking the difference between the embedded value with and without the inclusion of model points that relate to new business written over the year.

The determination of investment return variances will be similar to previously, although no longer needed for the VIF.

Analysis is still needed of the difference in the change in assets backing the free surplus over and above the assumed risk-free returns.

The other main component will now be the impact of the assets moving differently to the movement in BEL.

There may also be an impact on the cost of holding the risk margin and additional capital...

... e.g. if the underlying capital requirements change materially due to actual investment returns relative to those expected.

For the MCEV previously, the actual earned investment return would have been compared against the risk-free return plus any assumed illiquidity adjustment...

... in respect of any high yielding bonds that are held to back the annuities.

Under the proposed Solvency II approach, the actual return must now be analysed against the risk-free rate plus matching adjustment...

... or volatility adjustment.

In addition, there could be contribution to investment return variance if the risk-free yield curve moves differently to the asset yields.

This could be similar to under the previous MCEV approach, although the yield curves used may differ.

It may be necessary to include additional detail and commentary on the investment return variance...

... but this will depend on the extent to which these issues are already analysed under MCEV.

There is no longer a VIF on which to consider the effect of economic assumption changes.

Analysis of changes in the risk-free rate on the remainder of the embedded value calculations would require a similar approach to now.

Other considerations are as for the operating assumption changes.

And similarly for currency movements.

Other items such as development costs, tax, capital raised and distributed, and exceptional items could be dealt with in a similar way to now.

Candidates that went through the items in a logical way, highlighting the differences and similarities, scored well.

- (v) Some of the items are very similar.

However, many of the items and calculations are no longer relevant due to there being no VIF.

If the same format is used, then should at least adjust to show the release of the risk margin and SCR separately.

However, the items and calculations under Solvency II have more similarities with an analysis of surplus, and the company may therefore find it more appropriate to consider a format closer to an analysis of surplus.

Particularly as the format may otherwise confuse the reader into thinking that the experience variances are impacts on VIF as opposed to effectively being an impact on free surplus.

However analysts may prefer to have the same format as is currently disclosed,
as this makes it easier to compare.

The company should consider approaches being adopted by competitors, and the synergies that may be possible with regulatory reporting requirements.

Only the better candidates scored well here.

- (vi) Those people who are severely impaired are less likely to take an annuity (even an impaired annuity), due to them now being able to take all of their funds as cash.

New business volumes of standard annuities may also reduce as more flexibility is available.

This would have no impact on the current embedded value as that does not take account of new business.

Assuming that the business is normally written to be profitable on a best estimate basis, as would be expected to be the case, the future embedded value would be lower than otherwise.

The impact will reduce the new business contribution (in the analysis of change)...

... but would not be separately identified.

The removal of the requirement will not directly affect in-force business experience.

However, if future new business is expected to reduce then per policy expense assumptions may be increased.

This will reduce the embedded value.

It will come through the analysis as an operating assumption change.

It is unlikely that there will be a material impact on the experience variances,

...

... although a small expense loss may occur due to lower numbers to cover expenses.

If the investment strategy becomes constrained as the business runs off...

... then this could impact the investment return experience variance.

It is possible that the future mix of business will change, ...

... but it will take some while before the full impact on the target market will be known.

The company may need to reconsider and change its strategy going forwards. E.g. it may introduce a new product or close to new business, or decide to reduce headcount. *[Any example.]*

This may involve significant "one-off" costs.

If taken into account in the embedded value, this would reduce the embedded value.

If not yet incurred, the company may still make provision for the cost.

The company will need to consider whether this falls under development costs or exceptional items.

Most recognised that it would have little impact on the current embedded value as future new business is not included. Better candidates recognised that future embedded values would be affected by lower future new business due to implications for per policy expenses etc.

(vii) **Reputational / mis-selling risk**

Risks around mis-selling would have to be considered.]

Particularly as this is a more complex product which may not be well understood by the customers.

For example, if customers did not understand the personal tax implications, or if they were unaware of the risk of poor unit-linked performance.

Lack of understanding could also lead to bad publicity and reputational risk...

... especially if there was intervention by the regulator, ...

... which could result in lower levels of new business, across all products.

For example, the company is still planning on selling annuities to impaired lives. Depending on the level of health impairment, this may not be the most suitable option for the policyholder's needs.

In addition, a policyholder in ill health may want the security of the new product, but if they were to die very soon after buying it the company could be accused of mis-selling (they would lose the value of the insurance component premium).

There is a risk that the fund runs out before the age of 85, leaving the policyholder potentially with no retirement income between then and the guaranteed benefits at age 85,...

... which could lead to bad publicity.

The risk is exacerbated by how policyholder behaviour may change in the future.

In particular there is a risk that more people withdraw larger lump sums from the investment component.

Similarly there is a risk of mis-selling complaints if the value of the benefits payable from age 85 becomes trivial over time,

which could be the case if a fixed level is chosen...

... and inflation is high.

Regulatory / tax risk

There is the risk that the company may not be allowed to sell the product.

There is a risk of further changes to the regulatory/legal/taxation environment, which could impact the product adversely.

Based on historic experience where the government has introduced capped charges, for example under auto-enrolment...

... there is a risk that such caps would be applied to this new contract.

The government might re-impose limits to the amount that can be withdrawn, which would reduce the attractiveness of the product.

There is also a risk of the regulator changing the rules around how post retirement contracts can be sold, ...

... and this could result in higher costs or an unknown distribution environment.

There is a risk that any tax benefits the company builds into the contract, are either not allowable, ...

... or become non-allowable following further changes introduced by the government in the future.

Investment risk

The company may be predicting higher returns than are achievable on the unit funds,

particularly in the current low interest rate environment.

Poor investment return may lead to higher than expected levels of lapses.

Lower than expected investment returns will reduce the level of charges received under the investment component of the product

So expenses may not be covered...

... and profits will be reduced.

This is especially true if the charges are not reviewable.

Overall average investment returns might also be lower than expected due to policyholders choosing the low risk (so lower average return) fund options than expected.

In addition, the guaranteed insurance contract has a very long duration ...

... and there may not be relevant assets (particularly index-linked assets) available to back these liabilities, which introduces reinvestment risk.

Withdrawal risk

The receipt of future charges (and hence profit) also depends on persistency

The key risk is that withdrawals from the fund are higher than expected

This risk is exacerbated by the fact that there appears to be no limit on the amounts that can be withdrawn

Poor persistency may mean that initial expenses are not recouped ...

... depending on the extent to which these are covered by the initial charge.

There could be significant liquidity risk due to uncertainty in the level of withdrawals.

New business risk

There is a risk of selling much less new business than expected.

This could result in the development costs incurred in launching this product not being recouped

For example, the media may take a dislike to this type of contract.

This contract is more complex to explain than the immediate annuities...
... and the fees required for selling these contracts could be prohibitive for the customer.

There is a risk of selling much more new business than expected.

This could result in administration strain...

Or capital strain.

For example, this could be due to the media having given pension provisions a lot of coverage recently.

There is a risk of a much lower average premium size than expected...

... and that the charges taken from the unit funds are therefore lower and do not adequately cover fixed expenses.

Operational risk

The company has not sold unit-linked business until now, so lacks experience. Operational risks are therefore higher for this new product.

It does not have existing relevant experience, so may mis-price the product.

Customers are likely to expect to be able to view their current fund value on-line, which is not currently the case for the immediate annuities.

As the company is not used to providing this functionality, there is the risk of process errors, possibly leading to security breaches.

Systems will need to be changed or purchased – risk of errors.

Unit pricing processes will need to be established – risk of pricing errors.

Systems will be required to monitor withdrawals – risk that these are ineffective.

Administration staff will need to be hired and/or retrained – risk that this training is insufficient, leading to poor customer service.

So, there is a significant risk that errors will be made.

Counterparty risk

Given the fact that the company until now has not sold unit-linked business, it may wish to outsource the unit pricing and admin...

... and/or the management of the unit-linked funds.

This introduces counterparty risk.

Additional counterparty risk may also arise through the use of financial advisers or reinsurers, if it does not currently use them.

Expense risk

The expenses relating to the ongoing administration of the new product could be underestimated

Similarly investment management expenses for the unit-linked funds

The cost of developing and implementing the new product could be significantly underestimated.

Anti-selection / mortality risk

There is a risk of mis-estimating the mortality/longevity of the new target market.

There is a risk that fewer than expected policyholders die before age 85 than was allowed for in the pricing of the insurance component.

There is a risk that there is more selection by policyholders against the company than anticipated in the pricing...

... i.e. only those in good health take it out...

... which would reduce the profitability of the insurance component.

However it could be the case that impaired lives also want the security of this option, and the company may misprice the contract if it mis-estimates the expected mortality.

The target market of those buying normal annuities may also change given the changes in the regulations and so there is also a risk that this product is mis-priced accordingly.

This is exacerbated by the lack of data.

Competition risk

The company might face significant competition as the pension landscape has changed significantly.

Competitors may offer better guarantees, a better design or greater flexibility.

The company may be at a disadvantage due to not having the relevant systems already in place.

Industry bodies are likely to analyse all new contracts coming onto the market and raise awareness of the different products, which would encourage customers to shop around thereby increasing competition and driving down charges.

This question gave candidates the opportunity to apply their knowledge of sources of risk to an unusual product. This differentiated those who merely reproduced a list of risks from those that applied it to the question. Note that no marks were awarded for commenting on risks that the company already faced.

END OF EXAMINERS' REPORT