

Actuarial Society of South Africa

MARKING SCHEDULE

20 October 2023

Subject F205 - Investment

Fellowship Applications

The paper was written in online format, using a platform provided by ASSA. The exam setting and marking process was undertaken as normal.

The paper comprised of three questions in the standard format. The paper was structured to include a number of shorter sub-questions with smaller mark allocations. Question 1 (29 marks) covered an unusual funding instrument for a municipality and tested the concept of stagflation and the how different types of investment perform during such economic conditions. Question 2 (35 marks) dealt with the inclusion of private market or unlisted assets into a defined contribution fund's investment strategy arising from a transfer of assets from another fund. Question 3 (36 marks) assessed understanding of smoothed bonus portfolios and the associated capital requirements.

The exam covered a variety of important investment concepts and required candidates to use their sound knowledge of the theory and current industry developments to solve practical challenges affecting investment actuaries and their clients.

A handful of very well-answered scripts were received, deserving of a pass, with a further three papers in the region of the pass mark. The average mark for this exam was slightly below previous sessions. The overall result was that 16% of candidates passed. The majority of candidates scored FA or FB with a few attaining FC.

Please note that this examiner report presents one possible model solution to the questions. Alternative solutions provided are considered and marks awarded where correct points are well motivated.

Marks: half a mark per bullet unless indicated otherwise

QUESTION 1

Examiner Comments:

Question 1 focused on an unusual funding instrument for a municipality looking to reinvigorate a city centre. The question also considered the instrument as a potential investment for a defined contribution pension fund.

Part (i) considered the attractiveness of the instrument from the municipality's point of view. Results were mostly fair, although some candidates were perhaps thrown by the unusual nature of the instrument and failed to apply standard investment principles.

Part (ii) evaluated the suitability of the instrument from the pension fund's perspective. The question was well-answered by most candidates.

Part (iii) was a bookwork question that changed tack slightly to ask about stagflation. Most candidates understood this well, although a surprising number of candidates had no idea about this concept.

Part (iv) needed candidates to evaluate three types of investment and their behaviour in an environment of stagflation. Candidates who understood stagflation fared well.

i.

- SA government bond yields (risk free rate) are high currently (30-year bond yield currently ~12.5% to 13% p.a.).
- Cost of conventional borrowing for municipality will likely be higher than this, so conventional borrowing might be prohibitively expensive.
- The municipality's balance sheet might already be stretched (overindebted) limiting investor appetite to lend further amounts to the municipality.
- The municipality's budget is also likely to be stretched i.e. expenditure exceeding revenue so likely limited room for servicing additional interest expense.
- However, because the TIF structure directly links the interest paid on the bonds to incremental tax revenue
 - it does not put significant strain on existing revenue streams which means the municipality will not have to reallocate significant resources away from other public causes
 - this might also alleviate balance sheet concern for investors and open a new source of funding despite an already limited ability to borrow
- TIF lowers the risk to the municipality
 - If the project fails, private capital will shoulder most of the cost (through a below market interest rate)
 - However if the project succeeds, the municipality will still participate in the upside (based on the predefined proportion) from higher property taxes.
- The potential to earn a significant risk premium might entice more investors to participate in the bond issuance (and stimulate demand for the bond issuance).
- Issuance might be seen as innovative and improve the municipality's standing/attractiveness to capital markets.
- Long term (30-years) relieves refinancing/repayment pressure for a long time period which aligns with the long-term nature of urban redevelopment projects.
- A successful redevelopment plan will have outsized benefit on the city: increased economic activity, job creation, tourism, reduced crime and other social benefits. The bond could be considered an important catalyst for this to happen.

But

- The potential market of investors in the bonds (and hence demand for the bonds) might be limited by:
 - Unusual structure so complex and difficult for investors to understand (compared to vanilla bonds)
 - Riskiness to investors (minimum 5% return is low) means they would likely only participate if upside (risk premium to be earned) is significant i.e. the cost to the municipality in the event of a successful project is likely to be higher than if conventionally financed
- May be unpopular with certain ratepayers/residents
 - that private capital providers will receive a share of property taxes (which traditionally all go to public coffers). Perception that the municipality is selling off the city's future tax revenue... transferring wealth from future generations urban regeneration (and rising property prices) is sometimes accused of forcing poorer residents from their homes (gentrification)
 - Administration of the bond is more complex for the municipality.

[7]

ii.

Suitability in terms of matching fund liabilities:

- Liabilities of the fund are real
 - Min 5% coupon is fixed and unlikely to provide a real return.
 - However property rates likely to rise with inflation over time. This would be magnified by the effect of improved infrastructure as a results of the project. So if successful the bond is likely to generate a real return.
 - However expected return is uncertain.
- Very long-term liabilities (especially if considering member post-retirement liabilities) so 30-year term of bond is a good match for liabilities.
- ZAR based liabilities so bond a good match.
- Liquidity: fund requires some liquidity for flows (benefit payments/withdrawals). However this is likely to be limited to a small proportion of the fund each year.
 - Bond is likely to be extremely illiquid
 - So position sizing of bond in the fund is important
 - Fund is well placed to benefit from a liquidity premium on owning illiquid assets like the bond.
- Diversification: would need to limit position size within fund to limit concentration risk.
- Risk tolerance of trustees: would need to ensure overall risk budgets not exceeded by an investment in this bond.

What is the expected return from the bond?

- To estimate this, need to determine the expected future cashflows from the bond.
- This would require information on the property rates, the charging basis for customers, the size of the defined area of the city / city centre to be referenced in relation to the bond, total property m2, current municipal property valuations in this defined area, potential realistic valuation uplift over the next three decades.
- Must be based on property rates raised or billed and not collected as that exposes the bondholders to non-payment.

- Experience of similar projects worldwide. Consider the municipalities projections/assumptions for reasonability.
- What proportion of future tax revenue will bond issue share in?
- How is the bullet payment calculated?
- Pricing: will bonds be issued at par or will there be an auction.
- Size of the issue.
- Credit rating of municipality - is there a government guarantee, explicit/implicit.
- Compare the expected return with expected return from similar assets. Consider long-dated government bonds: the pension fund should expect to generate a significant risk premium for investing (as compensation for assuming the uncertain return, illiquidity, credit risk).

Other considerations

- Default risks – what would the impact of a municipality default be on the 5% coupon or principal payment?
- Legal risks – a view will need to be taken on the risk of the bond being restructured at a future date due to political decisions or legal challenges in courts by a future government.
- Would need to carry out a thorough due diligence on the municipality's financial health, governance practices, and track record of executing similar projects.
- Review the legal and contractual framework of the bond issue (incl terms and conditions), enforcement mechanisms, and investor protections.
- Potential time and cost overruns of the project may impact on / delay the city's rejuvenation and hence delay the uplift in property valuations and hence returns on the bond.
- Risk of municipality switching to revenue generation method other than property tax in the future.
- Size of pension fund.
- Existing asset allocation and allocation to similar type investments.
 - Existing allocation to property is important given the similar drivers of the bond's returns.
- Explore alternative investment opportunities that could achieve similar objectives (other fixed-income, real estate, or infrastructure investments).
- Compliance with Pension fund regulation (reg 28 limits).
- Complex to understand. The potential investment size will determine whether it is cost-effective to carry out credit and legal analysis on this bond.
- Valuation of the instrument is complex.
- Potential political hurdles at issue stage.
- ESG: investing in public infrastructure align well with trustee requirement to consider ESG.

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iii.

a.

Stagflation is an economic situation characterised by:

- high inflation
- accompanied by low economic growth, stagnant demand and high unemployment.

It presents a policy dilemma for central banks as the typical tools for lowering inflation (such as raising interest rates) may exacerbate the low economic growth and high unemployment.

[2]

b.

Specific TIF bond:

- Property prices likely to rise in nominal terms (if not in real terms) during periods of stagflation.
- So, property taxes likely to rise in nominal terms, which will serve to increase the annual coupon and increase the expected bullet repayment at TIF bond maturity. Hence provides some (potential) inflation protection.
- However, the risk is that economic stagnation results in lower economic activity in the city centre (lower profit for businesses and lower incomes for individuals), which impacts ability of tenants to pay additional property taxes and impedes the ability of municipality to raise property taxes.

SA nominal government bonds:

- SARB likely to raise interest rates to curb inflation.
- In addition, bond investors are likely to demand a higher nominal yield (to maintain same real yield).
- So government bond yields are likely to rise, this will cause bond prices to fall.
- Price moves aside, government bonds carry fixed coupon and principal repayments so the high inflation would reduce the purchasing power of the income generated from these bonds.

Gold:

- Over very long periods of time gold has proven to be an excellent store of value (maintain purchasing power).
- However over shorter periods the link between gold and inflation is more tenuous.
- Gold is traded globally and prices are set based on global supply and demand, so stagflation in any country, e.g. SA, has no impact on the gold price. Although not guaranteed, it can therefore offer protection against stagflation.
- Higher interest rates make holding gold (which has no yield) less attractive and gold has been known to underperform inflation when inflation is high (e.g. during early 1980's).
- Gold is priced in US\$ so any depreciation in the ZAR will boost the rand price of gold.

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[Total 29]

QUESTION 2

Examiner Comments:

Question 2 evaluated candidates' knowledge of the characteristics of private market or unlisted assets and some of the practical challenges in including them into a defined contribution fund's investment strategy.

Part (i) quizzed candidates on the suitability of private market assets for inclusion in the fund's investment strategy. The question was very well answered.

Part (ii) then focused on three specific types of private market assets. The results were good, although many candidates did not unpack sufficient detail in relation to these investments.

Parts (iii) and (iv) asked about the practical challenges in setting asset allocation for portfolios inclusive of unlisted assets. Results were not as good as would be expected of actuaries for an analytical question. Candidates did not demonstrate good knowledge of the specific characteristics of portfolios of unlisted assets.

Part (v) opened with a bookwork question on valuing companies in a private equity fund and then asked candidates to provide an estimated value for a company using some metrics provided for similar listed companies. Although candidates knew the methods of valuing companies, many surprisingly failed to apply these methods to the valuation and provide the shortcomings of their estimates. The final part of the question asked for the additional information required to recommend whether to invest in the specific private equity portfolio. The question asked about the portfolio and not the company. It was important not to focus only on the company but the portfolio with only a single investment. Failure to address this cost many candidates marks.

- i. Evaluate the private market assets:
 - In-depth due diligence of the managers and the specific portfolios.
 - Manager skills and reputation, track record on any previous portfolios, mandate drift, staff changes.
 - Size of private market assets in relation to combined value of assets after Section 14 has been received.
 - Fees including performance fees / carried interest.
 - Target investment period – usually 10-12 years for private equity, maybe longer for infrastructure, also expected remaining period of existing investments within the portfolios (might be less than original period).
 - Reinvestment of proceeds – when exits are paid out, roll over strategy into new private market portfolios with the same managers or new managers or else private markets exposure in the fund's strategy will decline over time; need to make a decision on whether this allocation is a permanent feature of the fund's strategy or specific to these assets.
 - Are the private market assets in SA or offshore?

Key considerations to decide on inclusion of private market assets into investment strategy:

- Check IPS for any restrictions – although can make changes if needed.
- Trustee knowledge – not just for upfront assessment but also ability to monitor portfolios.
- Asset consultant expertise – initial evaluation, ongoing monitoring, reinvestment strategy.
- Risk appetite of the fund
- Membership profile – potential membership shifts e.g. retrenchments, turnover (liquidity risks), age profile (indicating relative asset sizes of the two portfolios, liquidity too due to retirements).
- Limited liquidity
- Return expectations of the asset classes
- Include into one or both phases of life stage?
 - Allocation % - for both high growth balanced and de-risking phases.
- Impact on asset allocation, including overall allocation to private markets – will be smaller than it was in current fund due to larger asset size, is this appropriate? Is it too small to make sense and to justify the substantial work involved?
- Benefit of smoothing of returns relative to listed equities due to infrequent valuations.
- Ability to drive impact, development, infrastructure more directly than in listed investments i.e. stronger ESG metrics.
- Regulation 28 limits for private equity (15%), infrastructure (45%).

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- ii. Note that generic points repeated for all three do not earn duplicate marks – the solution asks for *specific* considerations. Marks require details of the specific features that might be different in relation to the three types of investment.

For private equity (PE):

- Stage of PE e.g. venture, mature or a mixture, early part of J-curve or later stage.
- Extent of drawdown of funds so far or still to be invested.
- Underlying investments – quality of investments made, any companies of concern within the portfolios, prior terminations and cash returned, number of investments remaining?
- Vintage, and spread of vintages (if any)
- Liquidity – cashflow profile
- Is the PE exposure in SA or global or both?
- Sector specialisation of PE fund(s), if any
- Proposed exit methods e.g. listing, PE sales, MBO
- Secondary market opportunities i.e. potential to sell out of any of the investments or funds
- Leverage utilised within PE deals and within portfolio.
- Valuation methodology, frequency, independence of valuator.
- Review agreements such as partnership agreement.

For infrastructure fund of funds:

- Does it include equity and debt or just one of these?
- Higher fees apply:

- additional fee layer in fund of funds;
- does fund of funds achieve lower fees at underlying manager level, in which case their fee may be at least partially covered?
- Better diversification than a single fund
- Better liquidity:
 - more regular cashflows based on larger number of underlying deals and timing of exit and return of cash;
 - cashflow management program a potential feature / value add.
- Reduced need for expertise to evaluate managers – although still a need to evaluate fund of funds.

For private debt:

- Type of projects funded.
- Time horizon of underlying investments – and duration.
- Yield - level of coupon / income vs maturity, higher yield will reduce the duration / allow income to be reallocated with impact on risk profile.
- Unlisted debt is an inefficient market with pricing anomalies.
- Risk of any defaults. Assess credit ratings, if available.
- Details of covenants.
- Different debt tranches e.g. subordinate, mezzanine, senior.
- Liquidity – not as good as listed debt but not as illiquid as private equity.

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iii. Practical challenges of private market assets in setting strategic asset allocation:

- Lack of market prices and valuations are subjective
- Historical data – no easily available indices to reference.
 - Infrastructure is a broad asset and a fund of funds may also include equity and bonds, with different investment characteristics.
- Survivorship bias within any data set used.
- Idiosyncratic risk in individual private equity, infrastructure and private debt funds limits the suitability of model output.
- Models tend to favour private equity due to the low volatility relative to returns that are more like equities, but this is due to infrequent valuations, so is an artificial artefact rather than an accurate representation of volatility / risk.
- Leverage, within the portfolios and underlying investments, can skew the risk vs return profile.

[3]

iv. For each portfolio:

- Objectives for the fund and members remain the same e.g. inflation plus targets, downside protection and alignment to the underlying investment strategy of the annuity strategy for near-retirement phase.
- Check IPS to understand why private market assets were not previously included in the fund's investment strategy.

- Model the SAA (using mean-variance optimisation, bootstrapping or similar method as preferred) adjusting for the inclusion of private equity, infrastructure and private debt – require historical returns, standard deviation, correlations between asset classes.
- Apply Regulation 28 limits to private equity and private debt. Also check limit for infrastructure although this is high at 45%.
- Consider liquidity requirements, especially for the de-risking portfolio.
- Given the artificially low volatility of private equity (due to infrequent valuations), instead of trying to model SAA, may choose to use existing SAA but treat private equity as a substitute for equity and make an explicit allocation to private equity from the listed equity component. The key question then becomes how much to allocate to listed vs unlisted equity – diversification, liquidity needs, volatility will influence final decision.
- Same could apply to private debt i.e. substitute for listed debt within the current bond allocation.
- Although infrastructure may incorporate equity or debt investments, it has unique characteristics so should probably be treated as a separate asset class.

[3]

v.

a.

There are a few different private equity valuation methods that can be used:

- Market approach e.g. referencing comparable listed company(ies) or similar precedent transactions using comparative ratios like:
 - Multiple ratios (with relevant ratios derived from listed companies in similar sector):
 - a) PE ratio
 - b) EV/EBITDA
 - c) Price to Sales ratio
 - Asset-based approach – Price to NAV
- Discounted cash flow (DCF)

[3]

b.

DCF method could be used, but the information provided is quite limited. Could possibly extrapolate past 5-year growth rates to get EBITDA into the future and then use dividend payout ratio to determine expected dividends to be discounted, but this is unreliable as an estimate. Would also need an assumption about when the target company commences paying dividends as it currently does not.

No information provided on any precedent transactions.

Metrics of comparable listed companies:

	Listed Co A	Listed Co B	Listed Co C
Price to EBITDA / PE	5.6	7.4	6.0
Price to Sales	0.36	0.70	0.28
Price to NAV	70%	96%	67%
Dividend yield	7.7%	1.4%	8.4%

[Inverse of these also acceptable]

[2 marks for table or similar, ½ mark per line]

Valuation estimate: [½ mark for metric, ½ mark for reason]

- Based on Price to Sales – probably closest to company B – R344m – may be too high until evidence of improved profitability emerges. But growth rate justifies higher multiple. Other two companies much lower.
- Based on Price to EBITDA – maybe use 10 i.e. higher than others due to faster growth off low base – R210m. Fast growing, but not very profitable yet.
- Based on Price to NAV – expect to use higher multiple as NAV is a poor measure for start-ups like this company appears to be, using 120% implies a valuation of R143m.
- Dividend yield – not suitable as no dividend paid by company being valued.
- High growth, not yet very profitable but J-curve effect likely, reinvesting in growth (no dividends), but higher risk start-up phase implies a valuation of between R143m and R344m – probably closer to mid-point. Upper end would be an expensive deal, lower end would be attractive.

Shortcomings:

- No insight into balance sheet gearing. Would ideally need to consider EV/EBITDA (rather than price/EBITDA)
- 5-year growth rate: impacted by base effects? Covid recovery?
- Limited information about the suitability / comparability of the three listed companies to the company being valued.
- Limited information and metrics about the companies, past performance trends including revenue and costs, future prospects, balance sheet information, free cash flow.
- The values of the listed companies are a snapshot based on the share prices on a particular day – which may not be representative or may be subject to change.
- Financial year-ends might be different dates with important timing differences in market conditions / shocks / economic shifts.

[7]

c.

Additional information to consider:

- This is not a direct investment in the underlying company, so an important consideration is the costs, fees and carried interest applicable to the private equity manager, which could be a significant drag on a portfolio with a single investment.

- If the opportunity / price is very compelling, rather consider making an offer to the PE fund to buy the company from the portfolio i.e. an exit for the PE fund. This is then a direct investment though, which means a different level of risk, governance, expertise, ongoing management needed.
- Any leverage inside the portfolio?
- Remaining term / exit plan for this investment – if the time period is short, it might not be worth the effort.
- Lack of diversification due to single company – only suitable alongside another private equity portfolio.
- Size of investment relative to overall assets of the fund, given that it is only one investment rather than a diversified portfolio.
- What percentage of the company does the private equity portfolio own? It is likely to not be 100%. If not 100%, is majority control desirable or minority stake and which is it?
- Outlook for the economy, the sector in which the company operates and the specific company's prospects and competitive edge.

[5]

[Total 35]

QUESTION 3

Examiner Comments:

Question 3 was a more technical question of particular relevance to investment actuaries. Unfortunately, knowledge of the mechanics of smoothed bonus products, their capital requirements and the capital charges associated with them, was weak.

Part (i) required candidates to defend the level of capital charge for a particular smoothed bonus portfolio. Very few candidates had the required knowledge of how smoothed bonus products and their charges work.

Part (ii) needed an in-depth understanding of the characteristics of smoothed bonus portfolios and the subsidies that can arise, in this case due to the book of clients being closed to new entrants. Most candidates did not understand smoothed bonus well enough to tackle this question effectively.

Part (iii) asked for an assessment of three alternative portfolios to replace the smoothed bonus. This was more familiar territory for those candidates who did not have a full grasp of smoothed bonus, so candidates picked up some marks here. Candidates needed to think carefully about the features of the specific portfolios to gain most of the marks.

Part (iv) tackled another variation to the existing smoothed bonus portfolio and required an understanding of matching using bonds as well as the operational issues associated with guarantees in a unitised portfolio. The question was not well answered.

i.

- Explain to policyholder the reason for the capital charge i.e. to cover cost of capital used by life company for the capital required to be held to back guarantees.
- What was disclosed in the marketing material?
- It is somewhat unusual for a capital charge to be expressed as a percentage of returns.
- Guarantees are more likely to bite when there are negative returns,
 - under this construct capital fees would be zero when there are negative returns and guarantees are most valuable/costly.
- No mention is made of asset allocation. Guarantees are more onerous (and would justify a higher capital charge) if there is higher exposure to volatile assets such as equities and property.
 - Consider any minimum exposure to volatile assets.
 - Use of derivatives within portfolio to manage volatility / downside.
 - Consider the current and historic exposure to volatile assets.

The capital charge also depends on:

- The target funding level
- How aggressively bonuses can be cut by the insurer when the funding level drops below the target funding level.
 - Is the bonus formulaic or does the insurer have discretion over it?
 - If the insurer has discretion, what is its past pattern of cutting bonuses in the face of a falling funding level?

- In the event of a shortfall, is the capital injection required from the insurer's shareholders treated as a loan (repaid when funding level recovers) or a permanent contribution?
- Are the asset returns on which the capital charges are based net of tax? Are they net of other fees? Are returns net of payments to make up shortfalls in book value versus market value?
- A 12-month period is relatively short for this type of charge that is structured in a similar way to a performance fee based on investment returns:
 - The main driver of the capital charge is expected market returns on the assets and market volatility.
 - The contribution of "alpha" or lack thereof by the insurer is relatively minor as a percentage of the total performance.
- A stochastic exercise is required to estimate the expected capital charges accurately.
 - If expected returns are 12% p.a., then the expected capital charge is roughly 2.4% p.a. (or slightly more due to periods of negative returns when the capital charge is not negative i.e. no rebate applies).
 - This compares to competitor capital charges for fully vesting smoothed bonus portfolios in the South African market ranging from 1.6% p.a. to 2.7% p.a.
- Where an insurer has a high capital charge, it may have lower other fees.
 - It is best to consider the sum of all fees, in establishing whether a policyholder is being overcharged.
 - The other fees are the investment management fees and platform fees.

[8]

ii.

The administration of smooth bonus portfolios involves tracking two accounts for policyholders:

- A book value which consists of contributions plus net bonuses less benefit payments.
- A market value which consists of contributions plus net investment returns less benefit payments.
- The ratio of the market value to the book value is called the "funding level".

When benefit payments occur at book value (as is usual), there are cross-subsidies between exiting and remaining policyholders:

- If the funding level is over 100%, the overfunding (surplus) with respect to the benefit payment is for the benefit of the remaining policyholders.
- If the funding level is less than 100%, the underfunding (deficit) with respect to the benefit payment is financed by the remaining policyholders.

These cross-subsidies are immaterial if the size of the benefit payments is a small fraction of the total size of the portfolio.

However, as the number of participants in a smooth bonus portfolio reduces, it's likely that the cross-subsidies become more material.

[2 marks for any similar explanation or example to illustrate]:

100 participants in a smooth bonus portfolio with a book value of R1m each (R100m total book value) and total market value is R90m:

- Funding level = 90%

- If a benefit is paid to one participant at book value, remaining policyholders have a total book value of R99m, a total market value of R89m and hence a funding level of 89.9%
- The impact is an immaterial reduction in funding level of 0.1%.

But if there were 2 participants left in a smooth bonus portfolio, each with a book value of R1m (R2m total book value) and the total market value is R1.8m:

- Funding level = 90% (the same as above)
- If a benefit is paid to one participant at book value, remaining policyholder will have a book value of R1m, market value of R0.8m and hence funding level of 80%
- The impact is a material reduction in funding level of 10%.

The impact of the underfunding that arises is either suffered by the remaining policyholder(s) via lower future bonuses or ultimately on benefit payment by the insurer (or possibly both), if there are no remaining policyholders to carry the cross subsidy.

The additional impact in a declining portfolio is that there may be certain fixed costs that become a larger percentage of the portfolio as it declines. Remaining policyholders carry this added cost burden.

[7]

iii.

General

- This would eliminate cross-subsidies between policyholders.
- There would no longer be a book value account. Each policyholder would own units based on current value, and the market value of those units would be paid out when the policyholder exits.
- There is no longer a need to charge a capital charge.
- Administrative complexity is less, so there is an argument that the fees covering this should be lower.
- All three options need to be fair relative to the offer made to premium-paying policyholders. Aside from issues of treating customers fairly, if the paid up offer is better, policyholders may stop paying premiums to take up the paid up offer.

1. Same underlying assets

- Likely to be a diversified portfolio with good long term growth potential.
- The policyholder would have a higher expected return by the amount of the capital charge and any reduction in administrative fees.
 - Assuming asset management fees are the same, since the assets are the same.
- The market value payable to policyholders can decrease because of removal of guarantees / smoothing.
 - Higher volatility than the smoothed bonus version
 - The extent of exposure to downside risk will depend on the extent to which the portfolio invests in assets with downside risk (e.g. equities,

property, offshore assets and to a lesser extent bonds) and their downside potential.

- Remaining policyholders will no longer have to subsidise policyholders leaving when the market value is down.

2. Fixed rate government bonds

- The (gross of tax) expected return would be equal to the expected return on the government bonds, less any investment management fees.
 - The investment management fees are likely to be lower, as this is a far simpler, more passive investment strategy than the balanced portfolio of a typical smooth bonus fund.
 - The SA Government bond fixed rate yield curve is currently about 10% for 5-year bond, 12% for 10-year bond and 13% for longer dated.
 - Whether the expected return is greater than under the smooth bonus fund depends on the size of the smooth bonus capital charge, investment management fee differentials, the duration of the government bonds, the asset allocation of the smooth bonus fund and the (net of tax) expected returns on the various asset classes.
- It is possible for SA Government bonds to fall in value; with the likelihood depending on the duration of the bonds and credit risk;
 - But it is less likely to fall in value than the typical balanced portfolio underlying a smooth bonus fund.
 - Default of SA Government bonds is unlikely, but has a greater probability than zero.
 - Volatility of portfolio of bonds can be higher than smoothed bonus.
 - High inflation will erode the value of fixed rate government bonds, whilst the other two investment strategies provide better protection in the long term.

3. Zero cost collars on an SA equity index

- Quite a complex investment for policyholders to understand.
- The expected return would be equal to the expected return on the zero cost collars, less any fees which are being charged:
 - It's likely that the zero cost collars are negotiated with an investment bank, and the bank will need to be engaged with to establish the fee.
 - This will probably be structured as part of the deal, i.e. the maximum return on each zero cost collar will be reduced to finance the fee to the investment bank.
 - A stochastic exercise would need to be conducted to estimate the expected return on the zero cost collars.
 - Whether the expected return is greater than under the smooth bonus fund also depends on the size of the smooth bonus capital charge, fee differentials, the asset allocation of the smooth bonus fund and the (net of tax) expected returns on the various asset classes.
- In an environment of high inflation and high returns, the cap is likely to throttle overall returns in this strategy, but yet inflation will still be high, which may result in low real returns.
- Diversification across asset classes is limited.

- Whilst zero cost collars offer a minimum return of 0% at their expiry, it is possible for them to have negative returns prior to expiry.
 - But they are less likely to fall in value than the typical balanced portfolio underlying a smooth bonus fund.
 - Default of the counterparty (the investment bank) usually has a very low probability, depending on their credit-worthiness.
 - Margining would further reduce risk, as would centrally clearing the derivatives.
 - Option prices are not known in advance, so will vary depending on prevailing levels of volatility, and particularly skew (since collars are primarily a skew trade). This makes it hard for policyholders to compare the future return potential to the other two approaches.

[11]

iv.

a.

There may be low take up of the option, which will result in low asset values and inability to match closely.

The portfolio of bonds is likely to have weighted average gross yield to maturity greater than 4% p.a.

- But the key is whether the net of tax and fees yield is greater than 4%?
 - Current yields are about 10% for 5-year bond, 12% for 10-year bond and 13% for longer dated.
 - Less estimate of tax.
 - Less sensible estimate of fees.

However, a fixed rate bond having a net yield greater than 4%, does not mean that its price always increases at a minimum cumulative rate of 4% or more. Downward pressure on the value of the bonds can be created by:

- Increases in fixed rates demanded by the market (a rise in the yield curve).
 - So, policyholders with maturities not equal to the average duration are exposed to interest rate movements at their maturity date.
 - The extent of exposure depending inter alia on the difference in duration.
- A reduction in the perceived credit-worthiness of the South African government.
- Default (although unlikely) on SA government bonds.

An increase in the statutory tax rate applicable to endowment policies would also have a negative effect on the ability to meet the guaranteed net of tax return.

There is also a risk posed by the new premiums, that can only be invested in future, at unknown yields. If yields fall to very low levels then the 4% may be higher than the yield on bonds after tax and fees. The impact of this scenario will depend on the relationship between the current assets at the time and the remaining total value of future new premiums. The risk

thus declines with time. Key dependency: are premiums escalating or flat? If escalating, this risk is higher.

[5]

b.

The shortfall at maturity of an endowment policy equals the excess (if any) of its guaranteed value (premiums grown at 4% p.a.) over its market value (units times price).

The shortfall could either be funded by remaining policyholders in the portfolio or shareholders.

If funded by remaining policyholders, then at each pricing point:

- The usual unit price is calculated.
- If there are guaranteed payouts due at that date and there is a shortfall, then:
 - A non-unit withdrawal is made from the portfolio for the shortfall amount.
 - The asset value of the portfolio is thus reduced by the shortfall amount.
 - A new, adjusted unit price is calculated.
 - A unit withdrawal is then made equal to the guaranteed payout less the shortfall i.e. the market value portion using the adjusted unit price.
 - The unit withdrawal is added to the non-unit withdrawal and paid to the policyholder/s - this should equal the guaranteed payout / benefit to be paid.

Funding by shareholders is relatively simple; with a unit withdrawal being made from the market linked fund, and the shortfall being made up by shareholders' funds i.e. a reduction in profit in that year.

[5]

[Total 36]

[Grand Total 100]