

INSTITUTE AND FACULTY OF ACTUARIES

EXAMINERS' REPORT

September 2016

Subject ST5 – Finance and Investment Specialist Technical A

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

Luke Hatter
Chair of the Board of Examiners
December 2016

A. General comments on the *aims of this subject and how it is marked*

1. The aim of this Finance and Investment Technical A subject is to instil in successful candidates the ability to apply, in simple situations, the principles of actuarial planning and control to the appraisal of investments, and to the selection and management of investments appropriate to the needs of investors.
2. A mix of questions styles is used, covering *knowledge* of the material set out in Core Reading, *application* of this in calculations and case studies and *higher order skills* such as synthesis and collation of recommendations. Marks are awarded for the constituent elements of calculations, not just for the final answer generated. Scenario appraisal will similarly provide credit for evidence of the issues considered, not solely for the conclusions reached.
3. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

B. General comments on *student performance in this diet of the examination*

1. The performance of students was in line with the historical average. As ever students who were well prepared did well. Again there were a number of students who either failed to read the question carefully, or, having read it answered a different question they would have preferred.
2. In numerical questions candidates should show their working and also define what their nomenclature means. If workings are shown the examiners can see where errors are made and follow the calculation through, thus resulting in the candidate receiving some marks rather than no marks.

C. Pass Mark

The Pass Mark for this exam was 60 .

Solutions

Q1 The merged life insurance company would benefit from economies of scale, [1]
such as sharing core services like marketing activities [½]
and spreading the fixed cost of management staff and IT systems over a larger level of
business written. [½]

There may be opportunities to cross sell products across the two sets of policyholders, [1]
thus increasing market share. There could be diversification benefits if the policies
written by the insurers are complimentary, [½]
e.g. the mix of annuity and insurance exposure and/or geographical location of the
insurance books. [½]

Another reason may be that the larger organisation is able to source more competitive
terms [½]
e.g. from its reinsurers [½]
and therefore increase competitiveness. [½]
Another financial motive may be a tax loss carry-forward if one of the insurers has
sustained a recent tax loss. [½]

The merged insurer is less likely to be taken over by competing insurers that remain. [½]

A more aggressive motive may be to eliminate inefficiencies (including
underperforming management). [½]

Earnings per share may be enhanced [½]
and dividend paying potential increased [½]

The merger may improve the security of accrued liabilities [½]
and reduce the need for additional capital support. [½]
It may also improve the regulatory position. [½]

The merger may improve the chances of paying a dividend to shareholders. [½]

A larger firm will find it easier to obtain and maintain a credit rating [½]

[Maximum 6]

This question was generally answered well, though some candidates simply wrote what they knew about horizontal mergers without putting it in the context of the question.

Q2 (i) Possible regulatory regimes for financial markets are:

- unregulated markets. [1]
- voluntary codes of conduct. [1]
- self-regulation. [1]
- statutory regulation/prescription. [1]
- freedom of action but with rules on publicity. [1]
- freedom of action but prescribed outcomes. [1]
- mixed regimes. [1]

[Maximum 3]

(ii) The repeated use of the term “should” indicates that this is not a form of statutory regulation. [1]

UK listed companies are required (under the Listing Rules) to report in their annual Report and Accounts on how they have applied the main principles of the Code. [½]

They have to confirm that they have complied with the Code’s provisions or – where they have not – to provide an explanation [½]

so that their shareholders can understand the reasons for doing so and judge whether they are content with the approach the company has taken. [½]

Thus, this is not an unregulated approach. [1]

While this could be regarded as a voluntary code, [1]

the fact that the FRC exists as an independent regulator [½]

shows that this is an example of self-regulation, [1]

with the threat of statutory regulation if a satisfactory system of self-regulation isn’t implemented. [½]

It could also be regarded as mixed regulation. [1]

[Maximum 5]

[Total 8]

Most candidates did well on part (i) and made a reasonable attempt at part (ii). Credit was given for different viewpoints where they were well argued.

Q3 (i) The fund manager has outperformed over five years but has underperformed over both three years and one year. [1]

The most recent year was particularly poor, [½]

but for that the fund’s performance over three years would also have been positive. [½]

The tracking error has risen over the five years [½]
with there being a sharp jump in the most recent year. [½]

[Maximum 2]

(ii) Information required would be:

The objectives of the fund manager. [1]
Over what time period is the Fund Manager supposed to outperform? [½]
What is the fund manager's benchmark? [½]
Are there any restrictions on the fund manager e.g. ethical. [½]

What tracking error limits are in the fund management agreement? [½]
Has the fund manager stayed within these limits? [½]

An explanation of the recent underperformance. [1]

Was it one particular stock or sector that underperformed [½]
or was it a more portfolio wide problem? [½]

Was the portfolio positioned for a more buoyant market [½]
and as a consequence were caught out by a falling market? [½]

What was the reason behind the increase in tracking error? [½]
Was it a deliberate attempt take more risk into the portfolio? [½]

Was the increase in the risk profile a reaction to the underperformance [1]
or was it initiated prior to the underperformance? [½]
If so, was this the cause of the underperformance? [½]
If it was a reaction to the underperformance what has performance been like since the increase in risk? [1]

What actions has the fund manager taken to address the source(s) of the underperformance? [½]

Had there been a change in personnel? [½]

Risk adjusted performance figures [½]

Had there been any significant cash flows? [½]

How had other fund managers performed? [½]

What was the style of the fund manager e.g. value or growth. [½]

[Maximum 6]

- (iii) The pension fund may not be allowed to invest in these newly emerging stock markets [1]
in which case either the investment mandate needs to be changed [½]
or further discussion is meaningless. [½]

The proposal would involve changing the asset mix of the pension scheme [½]
and exposing it to additional currency risk. [½]
It is likely that the risk profile of the fund would increase [½]
if this suggestion was adopted. Any such move would need to be examined in
the light of the liability profile. [½]

There may be higher fees [½]
and additional taxes may be payable. [½]

Past performance will not necessarily be maintained. [½]

[Maximum 3]

- (iv) The problems that may occur are:

The recent growth may not continue [½]
or current valuations may fully reflect the growth prospects. [½]

It may be difficult to find the necessary expertise to invest in these markets. [½]

The markets may be very illiquid [½]
making investment of meaningful amounts very difficult [½]
and resulting in higher volatility. [½]

Currency risk may increase. [½]

There may be problems regarding custody [½]
and underdeveloped financial systems and capital markets. [½]

There may also be more political instability, social unrest or corruption, [½]
with the possibility of assets being seized by the state. [½]

It may be difficult to repatriate proceeds [½]
and there may be restrictions on the amount that can be invested by overseas
investors. [½]

Transition costs may be considerable [½]
and there may be an increase in costs or fees. [½]

There may be additional taxes that are payable. [½]

The markets may be very concentrated in a few sectors
e.g. natural resources. [½]

[Maximum 3]

[Total 14]

A minority of candidates did not read the question carefully and assumed that the time period being considered was 3 years, not five years. This made gaining marks in part (i) more difficult, though it did not hinder their performance in the subsequent parts. A greater number ignored the tracking error in parts (i) and (ii), confining their comments to the performance of the fund.

Q4 (i) $NAV = 600000 + 19000 - 40000 = 579000$ [1]

Therefore NAV per share = $579000/80000 = £7.2375$ [1]

[Maximum 2]

(ii) The vehicle has outperformed when the market has fallen [1]
but underperformed when the market has risen. [1]

The vehicle's return has been much more stable than that of the market. [1]

Other possible points – lack of correlation [½]
due to income (and consequently asset value) being more stable/predictable

[½]
given it is coming from schools which are usually government backed. [½]
It has a low beta. [½]

The market does not seem to be a good benchmark for the vehicle. [1]

A better benchmark might be to look at an index made up of similar investments. [1]

On the positive side, a market index is easily available [½]
and simple to use. [½]

[Maximum 4]

(iii) There are a number of possible reasons why the vehicle is trading at a premium to its net asset value per share:

- Investors believe the asset value will rise. [1]

- This could be due to a change in regulation. [½]

- Or market conditions. [½]
- Management expertise is valued. [½]
- Investors anticipate a market fall and are switching into more defensive investments. [1]
- The underlying investment (schools) is attractive to investors, however access to these investments is limited. [½]
- The yield provided by the vehicle is attractive and is sustainable. [½]
- The vehicle is illiquid and there has been recent buying. [½]
- Investors suspect that the underlying assets are undervalued. [½]

[Maximum 3]

(iv) The risk differences are:

	<i>Fund A</i>	<i>Fund B</i>
Currencies	Only one currency involved	Income in a number of currencies
National vs international	Investments in one country. It is investing in state schools which are likely to be backed by the Government of that country. Dependent on the one country so risk is concentrated in that country.	Invests on a global basis Country risk is diversified.
Economic dependency	Income from the schools is likely to be independent of the economic situation	Income is likely to be dependent on the number of vehicles using the roads, which is dependent on economic activity.
Investment risk	The vehicle is fully invested.	The vehicle has not made any investments, therefore there is an investment risk. It may not be possible to find suitable investments at reasonable valuations. It will take time to invest the money.

	<i>Fund A</i>	<i>Fund B</i>
Track record	The vehicle has been trading for some time and the management has built up a track record.	It is a new vehicle with no track record.
Possible difference in income	If appropriate the vehicle will be paying a dividend.	Any dividend payment may need to wait until the vehicle is fully invested.
Possible taxation differences	Fund A operates under one taxation regime.	Fund B operates under many regimes.
Operational Risk	Fund A is already operating so reduced operational risk compared to fund B.	Fund B may face increased operational risks as it is new.
Counterparty risk	Both funds may face counterparty risk with respect to the operators of the assets.	

[Maximum 4]

- (v) The discount may be due to:

The cost of investing the cash.	[1]
Roads may not be an attractive investment proposition.	[1]
The vehicle is illiquid and there has been recent selling.	[½]
The lack of a management track record makes investors wary.	[½]
Fund B may be regarded as higher risk.	[½]

[Maximum 2]

[Total 15]

This was one of the better answered questions, most candidates scored well in parts (i), (ii) and (iv). However a substantial minority did not understand how the vehicle could trade at a price that differed from the net asset value.

- Q5** (i) (a) A par swap is an agreement where entity B agrees to pay entity A cashflows equal to interest at a predetermined fixed rate [½]
on a notional principal [½]
for a number of years. [½]
At the same time, entity A agrees to pay entity B cashflow equal to interest at a floating rate [½]
on the same notional principal for the same period of time. [½]
The currencies of the two sets of cashflows are the same. [½]

The notional principal is used only for the calculation of interest payments and is not exchanged. [½]

[Maximum 2]

(b) A swap agreement in which one party has the option to extend the life of the swap beyond a specified period. [1]

(c) A swap agreement in which the principal amount that is used to calculate the floating and fixed rate payments increases in a predetermined way. [1]

[Maximum 2]

(ii) A par swap has the effect of transforming the nature of the assets to better match the liabilities. [1]

A pension fund can exchange an unknown stream of payments [½]

(based on a floating-rate) into a guaranteed stream of payments [½]

(based on a fixed-rate) in order to assist the pension fund in better matching its liabilities. [½]

[Maximum 2]

(iii) (a) The present value of the floating payments can then be calculated as follows:

<i>Period</i>	<i>Semi Annual forward interest rate</i>	<i>Discount factor [1 for column]</i>	<i>PV of floating payment [1 for column]</i>
1	1.52%	0.985	1,497,242
2	1.63%	0.969	1,579,844
3	1.75%	0.953	1,666,979
4	1.91%	0.935	1,785,289
5	2.02%	0.916	1,850,722
6	2.14%	0.897	1,919,587
Total		5.655	10,299,663

[1]

[Maximum 3]

(b) The value of the swap must be equal to zero for both parties at time 0. [½]

So setting the value of the fixed payments equal to the floating payments:

Thus $10,299,633 = 5.655 \times \text{Fixed Payment}$ [1]

Therefore fixed payment = $10,299,633 / 5.655 = \text{£}1,821,426$ per half [1]

And annualised fixed rate = $2 \times 1,821,426 / 100,000,000 = 3.64\%$ [1]

[Maximum 3]

- (iv) To calculate the impact of the expenses use $i = 3.62\%$, therefore we get:

New fixed payment = £1,810,000 [1]

<i>Period</i>	<i>Fixed Payment</i>	<i>Discount Factor</i>	<i>PV of Fixed Payment</i>
1	1,810,000	0.985	1,782,900
2	1,810,000	0.969	1,754,305
3	1,810,000	0.953	1,724,132
4	1,810,000	0.935	1,691,819
5	1,810,000	0.916	1,658,321
6	1,810,000	0.897	1,623,576
Total			10,235,053

[1]

The value of the fixed payments less the floating payments:

= £10,299,633 – £10,235,053 = £64,611 [3]

[Maximum 3]

- (v) If interest rates decrease, the pension fund will pay out less than it had expected to. [1]
 This will reduce the loss [½]
 calculated in (vi) and may even turn the loss into a profit. [½]

[Maximum 2]

[Total 17]

A number of candidates struggled to define a par swap, however most could say what an extendable swap and an increasing swap were. In part (iii) candidates adopted a number of approaches with marks being lost for converting to annual rates or using the force of interest.

- Q6** (i) Policy switching involves taking a view on future changes in shape or level of the yield curve [1]
 and moving into bonds with quite different terms to maturity [½]
 and/or coupon [½]
 (e.g. if yields generally were expected to fall, the portfolio might be switched into longer-dated more volatile stocks).

[Maximum 2]

(ii) **Techniques**

Volatility: [1]

calculations of volatility or duration together with forecasts for changes in yields [½]

at different points along the yield curve can be used to estimate percentage changes in value [½]

and so to determine the area of the market which will give the best returns, [½] if the forecasts prove accurate.

Reinvestment rates: [1]

consider two bonds A and B, the latter having a longer term to maturity.

Knowing their yields to maturity, [½]

it is possible to compute a rate at which the proceeds of the first bond would have to be reinvested, [½]

up to maturity of the second bond, to match its total return. [½]

If this reinvestment rate is particularly high, it may be considered unattainable, [½]

leading to the conclusion that bond B offers better value. [½]

This analysis should be carried out at various points along the maturity range [½]

to work out the reinvestment rates between each bond and the next.

Spot rates and forward rates: [1]

a similar technique to using reinvestment rates is to derive forward and/or spot rates [½]

from the yield curve. This may reveal oddities [½]

in the term structure of interest rates which give rise to a policy switching opportunity.

[Maximum 5]

(iii) **Alternative bonds and bond-like investments – eight from:**

- agency bonds. [½]
- investment grade corporate bonds. [½]
- high yield bonds. [½]
- convertible bonds. [½]
- distressed bonds. [½]
- event linked bonds. [½]
- local authority bonds [½]
- foreign currency bonds [½]
- supra national debt [½]
- interest rate and inflation swaps. [½]
- credit default swaps. [½]
- total return swaps [½]
- mortgage backed securities (MBS). [½]

- asset-backed securities (ABS). [½]
 - preference shares [½]
- [Other relevant alternatives were given credit.]*

[Maximum 4]

(iv) Considerations with alternatives

The additional return or yield premium that a non-government bond offers over a government bond is generally regarded as being made up of two elements (1) an additional yield to compensate for the risk that the bond issuer will default [1]
(and fail to fulfil its obligations) and (2) an illiquidity premium to reflect the weaker marketability of non-government bonds [1]
to government bonds. There are some additional structural factors in particular with swaps which are also factored into the price. [½]

The portfolio manager will take a view as to whether the additional yield for default and liquidity are correctly priced into the bond, [1]
purchasing bonds which they believe will provide greater “pick-up” [½]
relative to the additional risk of holding the bond. [½]

There may be costs involved. [½]

[Maximum 3]

(v) Alternative bonds and bond-like investments may not be appropriate for the following reasons:

Additional yield: The manager has investigated the additional pick-up generated by the assets [½]
and does not believe that that the additional risk taken justifies the additional return generated [1]
(e.g. citing the recent credit crisis as an example of losses in ABS and MBS).

- The investment restrictions may not allow investment in the other types of bonds or bond-like investments [1]
- Risk: Given the additional risk that would be taken from the analysis/modelling carried out, the risk levels (e.g. Value at Risk) exceed those acceptable [1]
to the Scheme.
- Strategic: The government bonds are being held to match the liabilities of the Scheme [1]
and investing in alternatives will affect the quality of the matching characteristics of the Scheme's matching strategy. [½]

- Strategic: The government bonds are currently being used as part of the investment strategy [1]
and therefore they do not provide a simple source of funding for alternative bonds [½]
(e.g. held as collateral for other derivatives, held for an upcoming risk transfer exercise). [½]
- Cost/benefit: The manager has analysed the costs of rotating the portfolio from government bonds to non-government bonds and believes that the costs incurred outweigh the benefits [1]
(or the payback period is not short enough) [½]
- Other factors to be considered are liquidity, [½]
the possible impact of taxation. [½]
There may be a lack of expertise [½]
or the concept may be too complex to be understood. [½]

[Maximum 5]

[Total 19]

Well prepared candidates did well on this question, however those who had not prepared well struggled on parts (i) and (ii), most candidates did well on part (iii) with a more variable result in parts (iv) and (v).

Q7 (i)

	Fund Value at End year 1	Fund Value at Start of year 2			
Emerging Market Equities	44.0	30		Disinvestment	
Small Cap Equities	61.6	47.6		Equities	42
Large Cap Equities	31.8	17.8		Bonds	18
Total Equities	137.4	95.4			
Corporate Bonds	37.8	28.8			
Government Bonds	29.1	20.1			
Total Fixed Income	66.9	48.9			
Cash	10	10			
Total	214.3	154.30			
Fund Value at start	200				
As the benchmark is rebalanced annually it is assumed that 20% of the benchmark is invested in each of sectors.					
		End year 1		End year 2	
		Fund Value	Benchmark Value	Fund Value	Benchmark Value
Equities		137.4	130.4	106.01	101.2208
Emerging Market Equities		44	44.4	32.7	33.6374
Small Cap Equities		61.6	43.6	54.264	34.5632
Large Cap Equities		31.8	42.4	19.046	33.0202
Fixed Income		66.9	83.2	51.144	65.7318
Corporate Bonds		37.8	43.2	30.24	33.0202
Government Bonds		29.1	40	20.904	32.7116
Cash		10	0	10.1	0
Total		214.3	213.6	167.254	166.9526
% performance		7.15%	6.80%	8.40%	8.20%
Performance v Benchmark		0.35%		0.20%	
		Year One		Year Two	Total
Fund return		7.15%		8.40%	16.15%
Benchmark return		6.80%		8.20%	15.56%
Equity return		9.92%		11.12%	
Bond return		2.92%		4.59%	
Outperformance					0.59%
Equity Stock Selection		1.00%		1.00%	2.01%
Fixed Income Stock Selection		-1.38%		-2.00%	-3.36%
Stock Selection		0.18%		-0.02%	0.16%
Sector Selection		0.18%		0.21%	0.39%
Total Fund		0.35%		0.20%	0.55%

[Maximum 17]

- (ii) Bonds – Overall, the portfolio managers have underperformed. [1]
 Advice could be to investigate whether their “bets” have been incorrect [½]
 or if constraints imposed upon them [½]
 have led to underperformance.
 Options might be to replace the portfolio managers to
 find managers who could produce better results. [1]
 The other alternative is to run the bond allocation on a passive basis [½]
 which would produce similar results but cheaper. [½]

Equities – Overall, equities have added reasonable value over the period in question [1]
and therefore, the consultant is not likely to recommend any change from the current structure [½]
as it appears active manager has added value.

Asset allocation – has added minimal value over the period. [1]
The consultant might be recommending that the fund does not need an active asset allocation [½]
and therefore could get rid of the asset allocation manager. [½]
The poor results might also be due to limited constraints to adjust portfolio [½]
so this also needs to be investigated further.

Any other sensible suggestions based on actual results of equities outperforming, bonds underperforming and asset allocation being relatively flat.

[Maximum 4]

[Total 21]

The published solution to part (i) is just one of a number of potential solutions and it was possible to gain full marks irrespective of the method used.

If candidates arrived at different answers in part (i) they were still able to gain full marks in part (ii) provided their comments were relevant to their answers in part (i).

END OF EXAMINERS' REPORT