

EXAMINATION

April 2005

Subject ST5 — Finance and Investment Specialist Technical A

EXAMINERS' REPORT

Introduction

The attached subject report has been written by the Principal Examiner with the aim of helping candidates. The questions and comments are based around Core Reading as the interpretation of the syllabus to which the examiners are working. They have however given credit for any alternative approach or interpretation which they consider to be reasonable.

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Chairman of the Board of Examiners**

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Generally candidates were able to make reasonable attempts at most questions. Whilst there were some incidences of weak knowledge of bookwork, those candidates who failed usually scored poorly on application and or higher level skill aspects of questions. The following comments are written to assist candidates with understanding what the examiners are looking for. The solutions should not be regarded as complete but as a guide to the amount of knowledge and level expected. Other reasonable points and interpretations were awarded appropriate marks.

Q1. This was a bookwork question and well answered. Candidates failed to pick up marks primarily under the influences section of (i). Marks were also lost for incomplete explanations in (ii) especially under classical and split-rate where the shareholder's position was often ignored.

Q2. Another bookwork question that was done well. Points tended to be lost because of incomplete explanation of points.

Q3. This question was poorly done. Whilst most could attempt (i), the remainder of the question seemed beyond many candidates as they were unable to demonstrate that they understood what the issues were and how they needed to be dealt with.

Q4. This was well done although it was interesting that continuous interest rates were determined rather than yearly rates. Calculation of the price of the 2-year bond required the use of yearly rates given the information supplied. Where an error was made in the calculations this was penalised only once and provided this was carried through marks were awarded for subsequent calculations.

Q5. This type of question gets set on a regular basis and the examiners are always surprised at the spread of answers that they encounter and the failure to use specific pieces of information supplied, particularly in relation to part (ii) of this question. Candidates should realise that all information is there for a purpose usually to assist them in framing their answers in an appropriate manner. The solution shows the answer that is most likely to be encountered in the real world. However no penalties were applied for the more unrealistic assumptions that were often used regarding the timing of contributions and income. The examiners believe that full analysis should be undertaken in a question of this nature as illustrated in the solution.

Candidates are encouraged to set out the formulae that they use as this will ensure that when a mistake is made marks can still be awarded for subsequent calculations.

While many candidates scored well in (i), few candidates were able to attain significant amounts of marks in (ii). Explanations tended to lack the detail necessary to attain the marks on offer.

Q6. This question was done well being predominantly bookwork.

Q7. Of all the questions this was the one that candidates had most difficulty with. Answers in (i) were basically what the examiners view as "brain dumps" and were not focused on the question as set. Accordingly poor marks were awarded. Very few good answers were seen for (ii) but many managed to collect around half marks in (iii) despite poor attempts at the earlier sections.

1 The factors to be considered are:

- The total rate of tax on an investment.
- How the tax is split between different components of the investment return.
- The timing of tax payments.
- Whether the tax is deducted at source or has to be paid subsequently.
- The extent to which tax deducted at source can be reclaimed by the investor.
- To what extent losses or gains can be aggregated between different investments or over different time periods for tax purposes.

Influences on these factors are:

- tax rates on capital gains
- tax rates on income/dividends
- exemptions and allowances against tax
- rules on particular assets
- investor's own status
- investor's financial position
- investment vehicle's tax efficiency

- (ii) **Classical:** A company's profits are taxed twice: once in the hands of the company and once in the hands of the shareholder. The shareholder may be subject to tax on dividends and/or capital gains arising from increases in the share price.

Split-rate: Similar to the classical system excepting that different tax rates may be levied on retained profits and distributed profits. The system might be used in conjunction with a system that taxes investor's income and capital gains at different rates.

Imputation: A system designed to enable a company's profit to be taxed once rather than twice. Dividends paid from taxed profits are paid to shareholders together with a tax credit. The rules vary greatly and can be quite complex but it is often the case that the tax credit received is sufficient to offset the tax due on the net dividend. Also, lower taxed investors can often reclaim the tax credit.

- 2** While the Dow Jones and Nikkei are indices that are often quoted they are not particularly representative of their markets. The Dow Jones Index is based on 30 shares and the Nikkei is based on 225 shares.

The S&P 500 and Topix are more broadly based being based on 500 and 1,100 shares respectively. They are therefore more representative.

Both the DJ and N are unweighted indices, that means that every company has the same impact on the index.

Both the T and S&P are weighted indices, the weights being the market capitalisations of the companies, this means that larger companies have more influence on the index than small companies.

The constituents of the N have changed little since inception whereas the Japanese stock market has changed significantly.

The DJ is made up of 30 industrial stocks and therefore ignores the impact of other areas e.g. financials.

The constituents of both the S&P & T are revised regularly and encompass the full range of companies operating in their respective markets.

Therefore the S&P & T are better indices to use when looking at fund performance as they better represent the universe from which fund managers can select stocks.

- 3**
- (i)
 - to correct market inefficiencies and to promote efficient and orderly markets
 - to protect consumers of financial products
 - to maintain confidence in the financial system
 - (ii)
 - to remove volatility in the insurance companies solvency margin
 - to reduce the inherent investment risk of the shareholders' investments
 - get a better price than a public sale
 - to avoid negative publicity/speculation arising from a public sale
 - (iii) (a) Any regulatory or recommended limit on the maximum (and minimum discount).
- Discounts applying to similar private placements or block trades.
- (b) Normal daily volume in the shares and transaction prices.
- (iv) Being seen to avoid conflicts of interest (who instigated transaction and why).

Treating customers fairly (suitability of investment; appropriateness of terms) and so satisfy regulator's Principles of Business.

Is the asset manager involved in the transfer and will they be paid for "managing" the holdings thereafter.

Any lock in period that restricts the shareholders dumping the stock at a later date.

Respective size of the policyholders fund into which the stock is being transferred,
its benchmark and mandate, concentration of holdings, nature of underlying investments (direct or commingled funds)

Who are other shareholders — how free is float?
Volatility of share price and impact on portfolio risk

- 4** (i) Starting point is to take the market prices of conventional bonds (e.g. gilts) for a range of possible maturities.

Starting at the shortest maturity, T1 say, use the observed market price and solve for the yield. This yield is an approximation for the zero coupon rate for maturity T1, called R1, say.

Using the next shortest maturity conventional bond maturing at T2, again take the observed price and using R1 solve for the forward rate starting at T1 for the period T2–T1. Now solve for the spot rate R2.

Repeat using the next maturity conventional bond until the longest maturity bond has been used. This fixes the longest spot rate at the maturity of the longest bond.

Plot the spot rates $R(T)$ against T — to arrive at the zero coupon yield curve.

- (ii) This is the coupon rate that the bond would be required to make the theoretical value of the bond equal to its nominal value under the prevailing pattern of zero coupon interest rates.

- (iii) $S1: 102.01 * (1 + S1) = 100 + 6.75 \Rightarrow S1 = 4.65\%$

No price given for 2 year gilt so need to calculate:

$$P2: P2 * (1 + 0.049)^2 = 9.5 * (1 + 0.049) + 100 + 9.5 \Rightarrow P2 = 108.56$$

Now solve for S2

$108.56 * (1 + S2)^2 = 9.5 * (1 + 1f1) + 109.5$ where 1f1 is the 1 year forward rate starting in 1 years time

$$(1 + S2)^2 = (1 + S1) * (1 + 1f1)$$

$$\Rightarrow S2 = 4.91\%$$

$$S3: 110.41 * (1 + S3)^3 = 7.75 (1 + 2f1)^2 + 7.75 * (1 + 1f2) + 107.75$$

$$(1 + 2f1)^2 = (1 + S3)^3 / (1 + S1) \quad (1 + 1f2) = (1 + S3)^3 / (1 + S2)^2$$

$$\Rightarrow S3 = 3.94\%$$

If continuous rates used the answers are S1=4.54%, S2=4.80% and S3=3.86%.

P2=108.32(using continuous rates) is not correct but we do not penalise in other calculations.

5 (i) Contributions occur halfway through the period.

Generalised formula for return (each class):

$MV(1) = MV(0) * (1+i) + C * (1+i/2)$ using the normal approximation for a half year's interest.

$$[MV(1) - MV(0) - C] / [MV(0) + C/2] = \text{Return (\%)}$$

$$\text{Equity return} = (700 - 600 + 12) / [600 + 12/2] = 18.86\%$$

$$\text{Bond return} = (450 - 350 - 63) / [350 + 63/2] = 9.70\%$$

$$\text{Cash return} = (50 - 50 + 1) / [50 + 1/2] = 2.02\%$$

$$\text{Fund total return} = (1,200 - 1,000 - 50) / [1,000 + 50/2] = 14.63\%$$

$$\text{Bond Index return} = 1,299.3 / 1,220 - 1 = 6.50\%$$

$$\text{Equity Index return} = 1,115 / 1,000 - 1 = 11.50\%$$

$$\text{Benchmark return} = [50 * 1.065 + 50 * 1.1150] / 100 - 1 = 9.0\%$$

In allocating performance the fund weights should be the average weights based on the denominator of the fund returns but initial market values used as weights would not be marked as wrong

$$\begin{aligned} \text{Equity Asset Contribution} &= (594 / 1,025 - 0.50) * (11.50 - 9.0) \\ &= 0.20 \end{aligned}$$

$$\text{Bond Asset Contribution} = 0.32$$

Cash Asset Contribution = -0.34 (as it is not part of the index assume return = actual, although 3.5 to 4.0 could be used and then a stock contribution would have to be calculated)

Equity Stock Contribution = $594/1,025 * (18.86 - 11.50) = 4.27\%$

Bond Stock Contribution = $381.5/1,025 * (9.70 - 6.50) = 1.19\%$

The sum of the parts = 5.64% compared with actual 5.63% due to rounding error.

- (ii) Asset allocation positive in both bond and equity decisions but holding cash a negative.

Stock selection very positive for both bonds and equities.

Yield on equity investments was $15/594 = 2.53\%$ compared with 3.12% for index so investment strategy in equities is capital growth orientated or the timing of purchases and sales was such that a full year of dividend income has not been received.

Yield on bonds was $25/381.5 = 6.55\%$ compared with 4.5% [difference between bond index and total return index] for index. This suggests a portfolio away from the index possibly in lower quality corporate bonds or emerging market debt.

Cash return very poor given base rates.

Fund manager should be asked to comment on the strategy.

Strategy should be compared with mandate.

- 6** (i) Behavioural Finance looks at the mental biases and decision-making errors that affect financial decisions

The following challenge the view of the judge:

Anchoring – past experience adjusted to allow for evident differences to current conditions – herd instinct

Prospect Theory – how decisions are made when faced with risk and uncertainty

How questions are framed, especially if of a structured response variety

How risk aversion changes as time-frame or number of opportunities increases

Dislike of negative events – influences perceived probability of outcome

Ease of imagining – apparent likelihood increases with detail

Ease of bringing to mind

Overconfidence – hindsight bias

- confirmation bias

mental account – count individual gains/losses rather than netting them

primary/recency effect – first or last option to be presented more influential

range of options effect – more choice means less decision

status quo – preference to keep things as they are

regret effect – don't do anything in order to create no regret

ambiguity effect – premium for rules

(ii) Suitable examples/conclusions include:

- Recent past performance.
 - The what, not the how, and subject to manipulation.
- Size and reputation.
 - No one was sacked for buying IBM.
- Image.
 - Advertising, familiarity with brand.
- Client list.
 - Assume the others do the due diligence.

- 7** (i) S&M (quoted + 0.75% over sterling government bonds) has a poorer credit rating than BIM (quoted +0.50% over US\$ government bonds) as evidenced by the spread over corresponding five-year government rates.

To avoid any exchange rate risk on the exchange of interest rate payments, S&M will need to borrow at the five-year fixed rate of 6% per annum in sterling and receive payments at a rate of 6% per annum fixed for five years from the global investment bank as part of the swap design.

To avoid any exchange rate risk on the exchange of interest rate payments, BIM will need to borrow at the five-year fixed rate of 5.25% per annum in US\$ and receive payments at a rate of 5.25% per annum fixed for five years from the global investment bank as part of the swap design.

The difference between the US\$ payments by S&M to the global investment bank and the sterling payments by BIM to the global investment bank provides the margin for the global investment bank.

However, the global investment bank will probably want to charge a higher rate of interest to S&M than to BIM to reflect the poorer credit rating of the former.

- (ii) In arriving at its fee the global investment bank would probably wish to tilt the charges to BIM and S&M to reflect their relative credit ratings. Thus the

global investment bank may wish to charge S&M a somewhat wider margin than BIM.

One possibility would be to charge S&M a US\$ five-year fixed rate of 5.80% (1.05% over five-year US\$ government bonds) and BIM a sterling five-year fixed rate of 5.90% (0.95% over five-year sterling government bonds).

- (iii) The global investment bank is left with a residual foreign exchange risk on each exchange of interest payments between the two parties.

This risk could be hedged by forward foreign exchange contracts.

The global investment bank is also left with credit risk.

Credit risk could be hedged using credit derivatives.