Curriculum 2019

SPECIMEN SOLUTIONS

Subject SP5 – Investment and Finance
Specialist Principles
The term risk budgeting refers to the process of establishing how much investment risk should be taken and where it is most efficient to take risk in order to maximise return. [2]

A “feasible” set of asset classes that could be included in the portfolio (subject to any constraints specified in the mandate / investment agreement) are first analysed. This will consider the expected returns, volatilities and the covariances between asset class returns.

Some risk / return optimisation process is then used to select an initial asset allocation between the asset classes. A Value at Risk assessment will be used to determine the total risk budget – the risk tolerance in respect of the exposure to potential loss on the portfolio. The total risk budget is then allocated between strategic risk and (total) active risk, and finally the total active risk is allocated among the various asset managers.

It is important that the developing position of the chosen portfolio is monitored to assess risk exposures (increases and decreases in the value of the positions) and changes in volatilities and correlations. The portfolio will need to be rebalanced in the light of such changes, in order to keep the overall portfolio risk at the level defined as tolerable. [5] [Total 7]
2 (i) The price of an individual company’s shares is affected by the level of supply and demand for those shares. The key factors affecting relative demand for individual shares are investors’ expectations of:

- future dividend payments.
- future capital growth.
- the risks of the business and thus the uncertainty of estimates of the above.

Factors that drive expectations for capital and dividend growth are estimates of profits, free cash flow, and total enterprise value. [2]

(ii) Four from:

Oil and Gas companies – large companies, global and risky
Consumer goods companies – brand names
Industrial companies – profits move ahead of trade cycle, volatile profits
Utilities – high dividend yield
Financials – high gearing, volatile profits
Other sectors which could be used are: Technology stocks – risky, global
Consumer services – volatile profits, brand names [8]
[Total 10]

3 There is a mismatch between the index used for measuring returns, and the investment guidelines given to the manager.

This leads to an incentive for the manager to align the investment portfolio to the index rather than the investor’s investment guidelines. This may not be the investor’s expectation.

In some circumstances there could be significant deviations between the manager’s target portfolio and the actual portfolio, since the restrictions will constrain the manager. The manager will be uncomfortable with this as their active management process will be constrained.

Particular examples of situations where the deviations could be significant include:

- Composition of index differs markedly from a 50% government bond / 50% corporate bond mix.
- In particular, the index includes supranational and agency bonds.
- Duration of index differs markedly from a 50% government bond / 50% corporate bond mix.
- Different segments of the bond markets diverge in their returns (e.g. “flight to quality” scenario benefiting government bonds, or a “dash for trash” benefiting lower grade bonds).
• The size of the portfolio will also influence ability to gain access to corporate bond issues.

The performance fee strongly incentivises the manager to minimise risk relative to the aggregate index, rather than the investor’s expected portfolio. Indeed, the need to outperform the index by more than 1% to earn the performance fee may incentivise the manager to take excess risk. This may be exacerbated by the relatively low “fixed” fee.

For all these reasons, it would be preferable for the benchmark to be aligned more closely to the investment guidelines or if this is not possible, to restructure the fee to remove the performance fee.

4 (i) The total rate of tax on an investment.
How the tax is split between different components of the investment return.
The availability of personal allowances.
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.

(ii) Compared to the previous system, capital gains and income will be treated equally in terms of the rate of taxation, although there will be some deferral of taxation if capital gains are unrealised. Thus, there may be different effects depending on the individual investor’s personal tax position and their awareness of the impact of taxation.

Under the new regime, no specific savings wrapper (e.g. pension, insurance, deposit) would be tax favoured. This may lead to behavioural changes and disincentivise saving for long-term needs (e.g. retirement or care).

Due to a simplified tax system, it is likely that product designs will become simpler and administration costs may fall. However, where a product has now become taxable, additional features may be needed to attract customers.

With the only allowance being the annual personal allowance (covering all sources of income), product sales are unlikely to have any strong seasonal effects arising from a desire to “use up” allowances in the current tax year.

Managers will respond by restructuring existing products where possible, and by launching new product designs to maximise demand. Some existing investments will not be amenable to restructuring.

Individuals are likely to find borrowing relatively more attractive since interest payments are deductible against savings or earned income.
The change to the taxation system may influence attitudes to overseas investment.

Other valid points raised were given credit.

5

(i) Recommend placing the correct answer as the 1st (or possibly the 2nd answer) because the last answer is probably most likely to be chosen (assuming the individual is attempting to read each answer).

If candidates are randomly choosing answers without reading them, then behavioural finance may not be very relevant.

(ii) Recommend placing the correct answer as the last answer because the first answer is probably most likely to be chosen (assuming the individual is attempting to read each answer).

If candidates are randomly choosing answers without reading them, then behavioural finance may not be very relevant.

(iii) The reasoning is based on the primacy effect, recency effect, anchoring and the effect of options.

Primary effect – people are more likely to choose the first option presented.

Recency effect – in some instances, the final option that is discussed may be preferred.

Anchoring is a term used to explain how people will produce estimates. They start with an initial idea of the answer (“the anchor”). They then adjust away from this initial anchor to arrive at their final judgement. A greater range of options tends to discourage decision-making.

In (i) the candidate's “anchor” could be considered to be the first answer, assuming that he/she read each answer and guessing, but they are likely to adjust away from it with each successive answer, making it less likely to be chosen.

The primary effect may be worn-off from this adjusting away. With the number of options being five, and with each requiring significant consideration due to the detail in each, it is likely that the effect of the greater range of options will discourage decision making – further reducing the primary effect.

This might leave the recency effect to be dominant – and result in candidates who read each answer and just make a guess, choosing the last answer. So
placing the correct answer towards the start is likely to minimise the chances of the candidate just guessing the right answer.

In (ii) the candidate's “anchor” could again be considered the first answer shown – assuming that he/she read each answer and was guessing. There is only one further answer so the effect of adjusting away from the answer will be smaller than in (i). There is a lower number of options compared to (i) – this would mean decision making will be discouraged to a lesser extent – so impacting to a lesser degree on the primary effect and the anchoring effect.

The recency effect is likely to encourage the candidate to choose the last answer. However, the combined effect from both the primary effect and anchoring is likely to outweigh it, consequently the dominant bias would probably be to choose the first answer.

So placing the correct answer at the end is likely to minimise the chances of the candidate just guessing the right answer.

6 (i) As contributions and investment income all occur on last day of each quarter, the index returns need to be calculated on a similar basis using the yield at the end of each quarter.

Assumptions underlying the calculations relate to the impact of tax, dealing costs and the accuracy of the data used.

**Time weighted return (%)**

<table>
<thead>
<tr>
<th></th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>(%)</td>
<td>1.56%</td>
<td>11.67%</td>
<td>6.49%</td>
<td>(5.51%)</td>
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</tbody>
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**Money weighted return (%)**

The quarterly returns are the same but the annual return is derived from

\[
3,600 \ (1 + i) + 56(1 + i)^{\frac{3}{4}} + 30(1 + i)^{\frac{1}{2}} + 187(1 + i)^{\frac{1}{4}} = 4,252
\]

This can be approximated by

\[
3,600 \ (1 + i) + 56(1 + 3i/4) + 30(1 + i/2) + 187(1 + i/4) = 4,252
\]

(1.56%) 11.67% 6.49% (5.51%) 10.23%
Index time weighted return (%)  

\[ R(t) = \frac{(I(t)*(1 + Y(t)/4))}{I(t-1)} - 1 \times 100 \]

where  
\( R(t) = \) total return for period \( t \)  
\( I(t) = \) index value at time \( t \)  
\( Y(t) = \) yield on index at time \( t \)

<table>
<thead>
<tr>
<th>Period</th>
<th>Fund Income</th>
<th>Index Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>52</td>
<td>41.4</td>
</tr>
<tr>
<td>Q2</td>
<td>60</td>
<td>41.9</td>
</tr>
<tr>
<td>Q3</td>
<td>60</td>
<td>40.0</td>
</tr>
<tr>
<td>Q4</td>
<td>68</td>
<td>44.2</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>167.5</td>
</tr>
</tbody>
</table>

(ii) Money and time-weighted are same for each quarter because cash flows occur at the end of each quarter, but annual is different and reflects time of cash flows and market movements.

Both underperformed the index by a considerable amount.

The first quarter is the period accounting for all the underperformance.

There is strong out performance in Q3.

Given the difference in income, capital return for the fund has been very poor.

(iii) Assuming that investment income is received at the end of the quarter (as specified in the question):

\[ [3,600*1,603/1,500*0.043/4] \]

(iv) As can be seen the fund was invested in stocks that yielded 40% more than the average for the index.

It is likely that high yield stocks underperformed in the year in question as overall the fund underperformed the index by a considerable margin.

The fund manager may have a yield requirement. If this is the case then perhaps a different index should be used to monitor performance.
7 (i) The main stages in an ALM exercise are usually as follows:

1. The key objectives that investment should aim to achieve need to be clarified. These involve objectives such as:

   (a) future solvency levels.
   (b) ruin probabilities of insolvency.
   (c) the level of risk between assets and liabilities.

2. Suitable assumptions to use in the study need to be agreed.

3. Data on the liabilities needs to be collected to carry out the projections.

4. The overall nature of the liabilities is considered – an analysis of cash flow projections under different scenarios is considered.

5. An analysis would be carried out to identify how the fund might progress in the future if different investment strategies were adopted.

6. Different asset mixes would then be analysed in more detail to assess the risks (relative to the liabilities) and the rewards of each alternative under consideration.

7. The results would be summarised and presented.

(ii) The insurer could hold a portfolio of government bonds (in the appropriate currency) until maturity to meet the future payments from the annuities. This approach is often described as “immunisation”.

This has the advantage of being a relatively simple strategy to adopt if there are sufficient bonds available in the market to match the liability payments.

Difficulties with this approach arise for the following reasons:

Such an approach requires a bond asset to be held that is equal in present value to the future payments discounted at bond yields (using the full yield curve). Therefore, only a partial hedge is only possible if asset cover is less than 100%.

This may be an issue if the insurer is struggling to maintain adequate capital reserves.

However, a leveraged exposure can be created using repo contracts.

If the latter payments are payable after the principal payment of the longest available government bond then it will not be possible to hedge these
payments at present (until longer maturity bonds become available, i.e. creating reinvestment risk).

Due to “gaps” between bond maturities (particularly at longer durations), there may be a need to reinvest or disinvest bonds prior to maturity, and the hedge may therefore be imperfect.

The use of government bonds gives rise to a (small) degree of credit risk that may not necessarily be reflected in the liability.

If the tax treatment of government bonds worsens, this may mean the assets are insufficient to meet the liability payments.

Due to the above factors, there may be some mark to market risks between the asset value of the bond portfolio and the present value of the liability payments discounted using the bond yield curve.

In some cases this may be a material risk factor, but in other cases this will be much smaller than uncertainties in the liability payments themselves or other portfolio risks.

This approach can be extended to annuity payments that are subject to indexation, provided there are bonds of the appropriate maturity available with the appropriate indexation built into their payment.

In markets where liquid and deep interest rate derivative markets have developed, additional flexibility in hedging fixed payments is available through the use of interest rate swaps.

Inflation-linked payments can similarly be hedged using inflation swaps in combination with an interest rate swap.

The use of swaps rather than bonds has the following advantages:

Interest rate and inflation swap markets may have longer maturities available than bond markets. Swap markets may have greater liquidity and lower transaction costs than bond markets.

Swaps permit hedging to be achieved without full asset cover being required, as they are a contract for difference rather than a funded asset.

Swaps are in most cases bespoke contracts that are agreed with a single counterparty, rather than a standardised listed security (like a bond). Therefore greater flexibility is possible within the schedule of payments.

The use of swaps does create the following complications and disadvantages:

If the investor wishes to enter into a swap contract directly then they will need to have ISDA documentation in place with one or more market counterparties
(typically investment banks), which is a legal document that is negotiated and can be expensive and time consuming to set up.

If the swaps are subject to collateralisation (to mitigate credit risk), then this will require the movement and investment of collateral on a daily or weekly basis.

The bespoke nature of a swap means that closing out a swap position is more complex than selling a bond. However, in a liquid market closing out a swap may in fact have lower transaction costs than selling a government bond.

Swaps are subject to counterparty risk, if the counterparty bank defaults. Whilst collateralisation will limit losses, if this happens a new swap will need to be put in place at potentially higher cost (replacement risk) or the hedge lost.

Under an interest rate swap, the receiver of the fixed interest rate will need to pay a floating interest rate to the counterparty. To the extent that there is investment risk in the assets that are used to generate the floating rate (e.g. cash or other assets), the swap will not mitigate these risks, whereas a government bond portfolio is intrinsically low risk from a credit standpoint.

If the swap interest rate curve moves differently to the government bond interest rate curve, this can create a basis risk, which could lead to a mark to market loss.

8 (i) Investment objectives should:

(a) seek to maximise returns subject to the trustee's best judgement of what is necessary to meet the liabilities.

(b) take account of their attitude to risk.

(c) consider a “socially responsible overlay” to address the environmental objective.

It is likely, therefore, that this fund will need to meet liabilities that are increasing due to inflation (not just underlying price inflation but the higher rates due to additional demand for care from an ageing population and the need for medical coverage). The liabilities are therefore “super-real” in nature. They are (relatively) short-term compared to a typical long-term investor as care needs will generally only persist for 8 to 10 years. They are likely to be denominated in domestic currency for each group of beneficiaries (although the global nature of the charity's operations suggests that some degree of exchange rate risk can be withstood). Alternatively, it is possible that the liabilities are denominated in many currencies if the charity provides care in
many counties. This would need a global investment objective covering the appropriate countries (or currency hedging) to minimise currency risk. The tax status of the charity should also be considered within the objectives.

The trustees are otherwise likely to be highly risk-averse, since the charity will need to be able to continue care provision irrespective of market conditions.

Additionally, their wish to have “minimal impact on the environment” will impose additional restrictions on the investment activities, the extent of which will be driven by the charity’s commitment to environmental issues. The charity may have other social and ethical restrictions on what can be invested in.

All of these considerations should feature in the investment objectives.

(ii) Infrastructure assets are generally characterised by high development costs (high barriers to entry) and long lives. They are generally managed and financed on a long-term basis.

Infrastructure assets tend to be single purpose in nature (such as gas pipeline, toll road or hospital). The private investor’s participation in the asset is often for a finite period although the assets themselves are characterised by their long lives.

One of the key characteristics of infrastructure assets is that they tend to be, or exhibit the characteristics of, natural monopolies. Firms operating in a natural monopoly, protected from new competitors by the high barriers to entry, may be able to earn abnormal profits by charging higher prices. Infrastructure assets therefore tend to be subject to varying degrees of government regulation. This is not necessarily to the detriment of investors in infrastructure, as it provides a level of certainty regarding the income streams that will flow from the asset. There may also be liquidity and/or diversification features to the investment that can be attractive to investors.

Although infrastructure assets vary in terms of the level of regulation they face, this regulation generally results in income streams that exhibit low growth. To compensate investors for this, infrastructure investments tend to be higher yielding than equity investments. In terms of capital values, this stable, high yield results in infrastructure assets displaying a lower level of price volatility than equity investments over the longer term. It also acts as a support to the price of infrastructure assets in periods of poor returns in the broader equity market. As such, infrastructure is often referred to as a “defensive” asset.

(iii) The general characteristics of infrastructure investment suggest that this could be a suitable asset class for the charity. Forecast returns from individual infrastructure investments vary depending on the characteristics of the
underlying asset, its maturity, risk and taxation treatment in the context of the prevailing macro environment. Over the longer term, as industry structures and regulatory regimes mature, the listed infrastructure sector will most likely behave like a hybrid between an equity and a bond. Returns will therefore be real in nature which will meet the charity's needs. Assets of a suitable term should be available. The focussed nature of the investment should preclude exchange rate risk.

Clearly, it will be necessary to assess the likely environmental impact of each investment project to determine whether it will be suitable for the charity, particularly due to the assets typically being large capital projects. Even here, though, there is scope for debate: for example, traditional environmental thinking tended to avoid involvement in nuclear projects, but with the increased focus on climate change and reduction in carbon emission, such projects are seen as more environmentally friendly. This might be less acceptable in the case of highway development, though.

(iv) Trustees should agree an explicit written mandate covering agreement between trustees and managers on:

- an objective, benchmark(s) and risk parameters that, together with all the other mandates, are coherent with the fund’s aggregate objective and risk tolerances.
- the manager’s approach in attempting to achieve the objective.
- management fees to be charged.
- clear time scales of measurement and evaluation.

The mandate should not exclude the use of any set of financial instruments without clear justification in the light of the specific circumstances of the fund (noting the specific environmental aspects relevant to the charity).

[3]

[Total 20]

END OF SOLUTIONS