

# EXAMINERS' REPORT

*November 2015 examinations*

## **Subject F105 — Finance and Investment Fellowship Principles**

### INTRODUCTION

The attached report has been prepared by the subject's examiners. General comments are provided on the performance of candidates on each question. The solutions provided are an indication of the points sought by the examiners, and should not be taken as model solutions.

### QUESTION 1

*Most candidates made a reasonable attempt at this fairly straightforward bookwork application question and on average about half the available marks were scored.*

- i. Most candidates approached this part of the question by stating the reasons for regulation and failed to integrate their solutions with the information given, namely that a voluntary code of conduct is in place, but which is clearly not meeting its objectives for various reasons as elaborated in the solution. As a result very poor marks were scored by the majority of candidates. Furthermore, candidates were asked to "outline", which implies "describe briefly without elaboration or explanation", and as a result marks were also forfeited by not properly aligning answers with the relevant command verb.*
- ii. Even though this part of the question may seem like a straightforward bookwork question, candidates were expected to integrate the information provided in the question, similar to part (i). An average mark was scored by the majority of candidates.*
- iii. Most candidates made a reasonable attempt to this part of the question, but it was clear that some did not appreciate that costs result from both the regulated authority and the regulated entity. In terms of financing the costs, most candidates were able to mention taxation. However, a disappointing number of candidates displayed their lack of understanding of this topic by making inappropriate suggestions such as that the government should print more money, or that the government should issue debt etc. and such attempts will not aid in securing a pass. An average mark was scored by the majority of candidates.*

i.

- The existing voluntary code of conduct may not meet its objectives: it may be ineffective or it may have broken down due to rogue operators refusing to comply with the code of conduct.
- The existing system may be out of date with the current financial market leading to a lack of public confidence in it.
- Introducing regulation (in general) of the financial markets may encourage development of the market, including an orderly and efficient market, and the economy, and maintain the future economic welfare of the country's citizens which may be the aim of the government policy.
- It may attract foreign investment, hence it would be desirable to introduce regulation to comply with international standards.

ii.

Advantages:

- It may command a higher degree of public confidence due to government involvement.
- It is more easily enforceable and less open to abuse than the alternatives, which may promote further development of the market.
- It may be run efficiently if economies of scale can be achieved through grouping its activities by function rather than type of business.

Disadvantages:

- It will be more costly and inflexible and slower to react to changes than voluntary codes of conduct for both for the government and participants.
- Impractical regulatory rules may be imposed that do not achieve the desired objectives since the government has no experience in financial market regulation.
- Consumers who rely on the regulation may take less responsibility themselves for their own decisions.

iii.

Direct costs will arise as a result of:

- The establishment of the regulatory authority
- and effect must be given to the regulatory framework, in that the regulator would consider and assess information provided by market participants and otherwise monitor their activities.

- The regulated entities having to comply with regulation, by maintaining, collating and supplying the requisite information to the regulator and / or consumer.

The costs can be financed through:

- Taxation
- Levies on the regulated participants, which may be passed on to consumers through charges and fees for the financial services rendered.

## QUESTION 2

*This slightly applied bookwork question was very well answered, as it was easy to generate enough credit worthy points for full marks. Only poorly prepared candidates failed to maximize their score.*

Economy moderately buoyant, no real prospects of rapid growth or recession.  
Conglomerate PER slightly buoyed by Industrials' better growth prospects.

Economy starts to move into recession.  
PER for Industrials likely to fall. PER for Utilities remain stable or even rise slightly. Net effect is a less pronounced fall, helped by Utilities.

Economic recession: "bumping along at the bottom" .  
Industrials' PER risen from low point. Utilities still higher rated with higher PER . Net effect is between the two, again helped by Utilities.

Green shoots of recovery  
Industrials' PER will rise. Utilities' PER may be below the Industrials. Net effect is a less pronounced rise, this time retarded by Utilities.

As growth continues , Industrials' PER will fall back towards Utilities.

### QUESTION 3

*This question was straightforward bookwork and handled comfortably by well-prepared students.*

Value factors - any three of:

1. Book to price
2. Dividend yield
3. Earnings yield
4. Cashflow yield
5. Sales to price

Growth factors – any three of:

1. Sales growth
2. Earnings growth
3. Forecast earnings growth
4. Return on equity
5. Earnings revisions

### QUESTION 4

*Most candidates scored very poorly in this application question which proved to be difficult yet useful to separate the deserving candidates from the rest.*

- i. *Bookwork which was poorly answered by most, resulting in the majority of candidates not scoring any marks in this part of the question.*
- ii. *The candidates who made an effort to outline the challenges were rewarded by an above average mark in this part of the question. For the most however, it was poorly answered with a few candidates being able to focus the challenges specific to that faced by investing in infrastructure. Even though the question was clear about the fund investing in two existing assets, many candidates assumed that these assets still had to be constructed and used this as a basis for generating points which unfortunately did not score any marks. Candidates must tailor their solutions in line with information given in the question, and unless specifically asked for assumptions, should not create fictitious scenarios to aid them in presenting a solution.*
- iii. *Very few candidates were able to produce sensible answers in this part, despite the question leading the candidate in structuring a proper solution. Most failed to recognize the political risk and its potential impact as a primary risk affecting both infrastructure assets. As for the detail required for the other primary risks affecting the two infrastructure assets, a wide range of unrealistic solutions were produced, scoring no marks. The inability to successfully identify the primary risks hampered most candidates' ability to show how these risks might be diversified by combining the investment in both in a single portfolio.*

i.

- Infrastructure assets tend to be single purpose in nature.
- The private investor's participation in the asset is often for a finite period.
- Infrastructure assets tend to have long useful lives.
- Infrastructure assets tend to be, or exhibit the characteristics of, natural monopolies.

ii.

- The scale of investment requires investors with a large asset base to invest.
- The risk/return profile would draw more mature investors, such as large pension funds.
- The liquidity of the investment may restrict certain investors who would not want to tie up too much of their asset base in long-term unlisted equity.
- Lack of infrastructure investment expertise.
- Establishing a pipeline of investment opportunities, i.e. creating and finding sufficiently appropriate opportunities to invest.
- The cost of bidding for potential infrastructure projects may prevent smaller investors from participating.
- Valuation issue: if the asset cannot be valued, investors may not want to invest.
- Sovereign / political and governance risks.
- Currency risks.
- Existence of regulatory approvals and guidance may encourage investment.
- Availability of potential tax benefits of investing.
- Environmental factors, such as risk of earthquakes or any other reasonable example of a general natural disaster.

iii.

- The primary risk for both assets, from the perspective of an international investor, is political, in that political decisions in either country could have a significant impact on the value of the investment unrelated to movements in the fundamentals of the asset concerned.
- A further primary risk to toll roads is patronage: the income generated is dependent on the number of road users which is dependent on the price of fuel and level of economic activity.
- Hence the risk is cyclical, dependent on the state of the economy (through the economic cycle).
- This primary risk is somewhat mitigated, however, by tolling a major artery that will always have reasonably high utilization.
- A further primary risk to wind farms is environmental risk (i.e. the availability of wind).
- It is less dependent on the economic cycle as there should be an increasing demand for electricity, since it is a developing economy.

- In this instance the realization of this primary risk is unlikely, assuming that due diligence has been conducted properly and the wind farm constructed in a consistently high (but not excessive) wind zone.
- By combining both types of infrastructure assets into one investment, these primary risks might be diversified and the overall risk exposure of the fund might be mitigated as they are situated in different countries, and hence not subject to the same source of political risk (although there may be some positive correlation between the political risks in each).
- In addition, the other primary risks (environmental and economic in nature respectively) are independent of each other, however catastrophic risk remains as (e.g.) a major earthquake might affect both the toll road and the wind farm.

## QUESTION 5

*For part (i) suggestions of discounted values of dividends were accepted, and students that appreciated the fact that dividends might only arise many years into the future and are subject to a probably currently undefined dividend policy, hence discounting these would be very subjective, got extra credit. Net asset value is unlikely to be useful for an internet company, and clearly price-earning ratios are useless if earnings are negative or nil, yet many candidates made this suggestion.*

*For part (ii) surprisingly few candidates thought of using a capped market capitalization as a weight, and most students were at a complete loss in this part.*

*Part (iii) was very poorly done. A common error was to use the dividend yield provided as at a specific date with a capital index as at a different date to calculate dividend income.*

(i)

Possible valuation methods:

- Discounted value of cashflows generated might be used given that the company is generating revenues. Cashflows are also not subject to potential accounting distortions.
- Discounted value of profits and/or dividends may be used, even though the company is not currently generating profits. Revenue and expense projections will indicate the point at which profits may start to emerge. The discounted value will be very sensitive to the discount rate used where profits are projected to start far into the future.
- Price multiple to some measure of the firm e.g.
  - active number internet users: a suitable multiple could be derived from similar listed companies in other countries. This is a very rough method given that the definition and value of an “active user” may vary significantly between companies.

(ii)

A possible modification:

- Use of a capped index, where the free float market capitalisation is capped to some level e.g. 10% of the total market capitalisation.
- The choice of the capped level may however be regarded as arbitrary.
- In a small market, the capping may lead to increasing the weights of smaller, less liquid stocks which investors may not be able to find stock to invest in.
- Very successful companies may continue their strong performance long after they have been capped in the index, resulting in the index being regarded as less representative of the market and the economy.

(iii)

Date	Capital Value Index	Dividend yield (p.a.)	Gross Dividend	Net Dividend (15% tax)	TRI
31 December 2014	1557	2.9%			100
31 March 2015	1678	2.6%	10.907	9.271	108.4169 or 108.3668
30 June 2015	1456	2.5%	9.100	7.735	94.509 or 94.5294
30 September 2015	1268	2.4%	7.608	6.467	82.6731 or 82.7435

$$\text{Net Dividend}_{31.3.2015} = 0.85(\frac{1}{4} * \text{DY}_{31.3.2015} * \text{CVI}_{31.3.2015})$$

Either FTSE methodology:

$$\text{TRI}_{31.3.2015} = \text{TRI}_{31.12.2014} * \text{CVI}_{31.3.2015} / (\text{CV}_{31.12.2014} - \text{Net Dividend}_{31.3.2015}) = 108.4169$$

Or alternative approach:

$$\text{TRI}_{31.3.2015} = \text{TRI}_{31.12.2014} * (\text{CVI}_{31.3.2015} + \text{Net Dividend}_{31.3.2015}) / \text{CV}_{31.12.2014} = 108.3668$$

Assumptions:

- Dividends are spread evenly/ distributed uniformly over the prior year

- Dividends are received and invested at the above dates i.e. 31 March, 30 June and 30 September 2015
- Capital Value Indices are shown just after the dividend being paid
- Capital Value Indices are assumed to fall immediately after dividend payment by the value of the dividend

(Recognition for any reasonable assumptions appropriately implemented.)

## QUESTION 6

*Overall, performance on this question was satisfactory. Well-prepared students were able to score well, but those who were not as well-prepared struggled to describe risk budgeting in sufficient detail (or in some cases, at all).*

The key objectives of the process are:

- Determining the total amount of investment risk the life insurer is willing to take in pursuit of returns. The key issue here is the risk appetite of stakeholders. This will require consideration of the objectives and attitudes of the primary stakeholders, in particular shareholders and policyholders, and be mindful of conflicts between these. Other stakeholders, such as bondholders, creditors, regulators and society broadly, should also be considered.
- Determining where it is most efficient to take risk: Allocation of total risk between strategic risk (mismatching the liability-matched benchmark, which requires a strong understanding of the shape and dynamics of the life insurer's liabilities) and active risk (the total latitude offered to individual portfolio managers in pursuit of outperformance of their benchmarks - allocating a material portion of the risk budget to active risk is justified only if it is believed that active management can generate positive risk-adjusted excess returns). Also recognise that there may be structural risk, although this should be avoided as far as possible as the insurer will not be rewarded for accepting this risk.
- Allocation of the total active risk budget across the component portfolios.

The process to be followed is as follows:

- Define the feasible set: the asset classes to be considered in portfolio construction. Estimates of mean return, variances and covariances/dependency structures will be important here. Consideration will have to be given here to those asset classes which the insurer management, having regard to stakeholder risk tolerance,

considers viable building blocks for the portfolio. Regulatory limits on individual asset or asset class exposure should impose constraints on the model allocation.

- b. Choose an initial asset allocation based on some risk/return optimisation criterion, and with an assessment of risk according to some agreed risk measure (e.g. Value at Risk or Expected Shortfall) to determine risk tolerance. Asset-liability modelling is likely to be used in this process. The selected risk measure would be used to determine the total risk budget and the strategic view of management to allocate this between strategic and active risk. ALM will allow the consideration of a variety of investment strategies in terms of the distribution of returns each offers.
- c. Active risk would then be allocated between portfolios and the benchmarks and active risk budgets built into the respective mandates.
- d. Risk exposures would be monitored dynamically as would changes in variances and covariances/dependency structures.
- e. The portfolio would be periodically rebalanced in response to these changes in an effort to keep overall risk within the agreed limits.

## QUESTION 7

*Part (i) was reasonably well-answered, with most candidates picking up most of the marks on offer, although relatively few recognized the operational risk inherent in the spot market transition. For part (ii), some, although limited, credit was given for non-derivative strategies, as derivative-based transition management was clearly anticipated as the focus of the response on alternatives to effecting the transition in the spot market. Credit was given for any reasonable example(s) of suitable strategies involving forwards, futures or swaps; arguments based on option strategies were only recognized if they were made coherently and recognized that the associated costs might render them less useful than those exposed on the upside and downside.*

- i. Transaction costs: brokerage, price impacts (if the transaction is sufficiently large), price movements if the transaction takes too long, bid-offer spreads and crystallisation of capital gains.

There will also be in-house costs of management and administration.

The major risk to which the transaction exposes the insurer is operational: the significant volumes of trades which would need to be effected in a short space of time gives rise to the risk of errors in trade instruction or execution.

- ii. A suitable transition management process would make use of derivative instruments to make immediate changes to the effective asset allocation without incurring the costs

described above.

The desired change in effective asset allocation could be achieved immediately by entering appropriate forward, futures or swap positions. For example, this could be achieved by entering into a long futures position on a suitable equity index with a position size equal to 15% of total assets and an equivalent short futures position on a bond index which best matches the performance of the underlying bond portfolio. Such a strategy may be exposed to cross-hedging risk if the assets underlying the futures contracts do not match those held.

This is a change to strategic asset allocation as it is driven by a change in the liabilities, not a tactical asset allocation decision. Accordingly, the change in the underlying position should be effected over time. As changes in the underlying portfolio are effected, the derivative position should be correspondingly unwound, e.g. by entering into offsetting futures positions.

## QUESTION 8

*This question was handled very badly. For part (ii) there were a few different ways to perform the performance attribution, and different approaches to the one below would have got credit if done correctly. Whichever approach used, whether one works from the benchmark return to the actual fund return or vice-versa, it is important in assessing profit sources that decisions (asset allocation, bond duration and stock selection) are changed one at a time in a methodical manner, otherwise the profit sources will not add up to the total profit. Most students did not seem concerned that the sum of their profits did not add up to their calculated total profit. Many students did not even attempt to assess the bond duration decision. A large number of students assumed quarterly rebalancing despite the details given in the question. In general students did not demonstrate much ability to perform an attribution analysis.*

*For part (iii) students would have got credit for appropriate comments, however exceptionally few students offered any insight into the results, with most students just translating in words the numerical results in part (ii).*

*Part (iv) was generally well done.*

(i)

The top-down approach to constructing and managing a portfolio involves a structured decision-making process which starts by considering the asset allocation at the highest level ie between different asset classes. Within each asset class an analysis is then made of how to distribute the

available fund between different sectors (eg different industries for equities) and finally the selection of the individual assets to purchase is made.

[Max 1]

(ii)

$$\text{Fund return} = [60\% \times (1.07 \times 1.02 \times 1.02 \times 1.01) + 40\% \times (1.04 \times 1.02 \times 1.01 \times 1)] - 1 = 10.32\%$$

$$\text{Benchmark return} = [80\% \times (1.05 \times 0.94 \times 0.96 \times 1.01) + 20\% \times (1.04 \times 1.01 \times 1.04 \times 1.01)] - 1 = -1.37\%$$

This 11.69% outperformance is made up of the following components:

***Asset allocation decision:***

$$\begin{aligned} &\text{Portfolio return (actual AA, benchmark duration and benchmark stock selection)} = \\ &[60\% \times (1.05 \times 0.94 \times 0.96 \times 1.01) + 40\% \times (1.04 \times 1.01 \times 1.04 \times 1.01)] - 1 = 1.55\% \end{aligned}$$

$$\text{AA decision impact} = 1.55\% - (-1.37\%) = 2.93\%$$

***Bond duration decision:***

$$\begin{aligned} &\text{Portfolio return (actual AA, actual duration and benchmark stock selection)} = \\ &[60\% \times (1.05 \times 0.94 \times 0.96 \times 1.01) + 40\% \times (1.06 \times 1.03 \times 1.05 \times 1.03)] - 1 = 4.65\% \end{aligned}$$

$$\text{BD decision impact} = 4.65\% - 1.55\% = 3.10\%$$

***Stock selection decision:***

$$\begin{aligned} &\text{Portfolio return (actual AA, actual duration and actual stock selection)} = \\ &[60\% \times (1.07 \times 1.02 \times 1.02 \times 1.01) + 40\% \times (1.04 \times 1.02 \times 1.01 \times 1)] - 1 = 10.32\% \end{aligned}$$

$$\text{SS decision impact} = 10.32\% - 4.65\% = 5.67\%$$

Alternatively: Total Fund – AA – Bond duration:

$$11.69\% - 2.93\% - 3.10\% = 5.66\%$$

[Total 5]

(iii)

The stock selection decision accounts for the largest component of the outperformance, while the asset allocation decision accounts for the smallest component. This is an unexpected result given

the top-down approach used by the manager. This result might be more consistent with that of a bottom-up manager. However even being the smallest component, asset allocation still yielded a positive result.

The very large equity outperformance (12.4% for the fund vs -4.3% for the benchmark) may be of concern and might suggest that the manager strayed from the mandate by either taking on excessive risk or abandoning the top-down focus. This should be investigated further.

The manager chose to be underweight equity and overweight long bonds. This position might have been due to a top-down analysis indicating a likelihood of economic slowdown or recession.

Benchmark equity returns for 2014 are -4.3%, while bonds had a much better year (10.3%) and long bonds returned 18.1%. This might suggest a move by investors away from equity and into bonds, perhaps due economic growth concerns.

If the high bond returns were due to capital gains (rather than high yields generally), this might be reflecting investor expectations of future monetary easing by the authorities to stimulate the economy.

A sudden decrease in long term expected inflation (and uncertainty about inflation) would also lead to reduction in bond yields. This is consistent with slowing economic growth.

The manager appears to have forecast these trends correctly and reflected this in his portfolio, and hence appears to have demonstrated top-down macro-economic forecasting ability.

Correctly forecasting an economic slowdown might have led to choosing defensive type shares that significantly outperformed the equity benchmark (12.4% vs -4.3%), hence the large stock selection impact.

Of some concern is the stock picking ability in the long-bond portfolio, where the manager earned 7.1% (compared to the benchmark long bond return of 18.1%). Further interrogation would be required to understand the reason for this poor result.

[Max 6]

(iv)

Limitations of the above analysis:

- It is based on past results, which might not be repeated in future. The circumstances which applied over the last year might not be repeated in future, and manager abilities that work well in some market conditions might work less well in others. A better assessment of a manager is to base it on a full market cycle, so the managers ability in both a bull and bear market are assessed. Also, deep structural changes to a market may make the manager's management approach less effective , e.g. more effective in a closed economy/market .

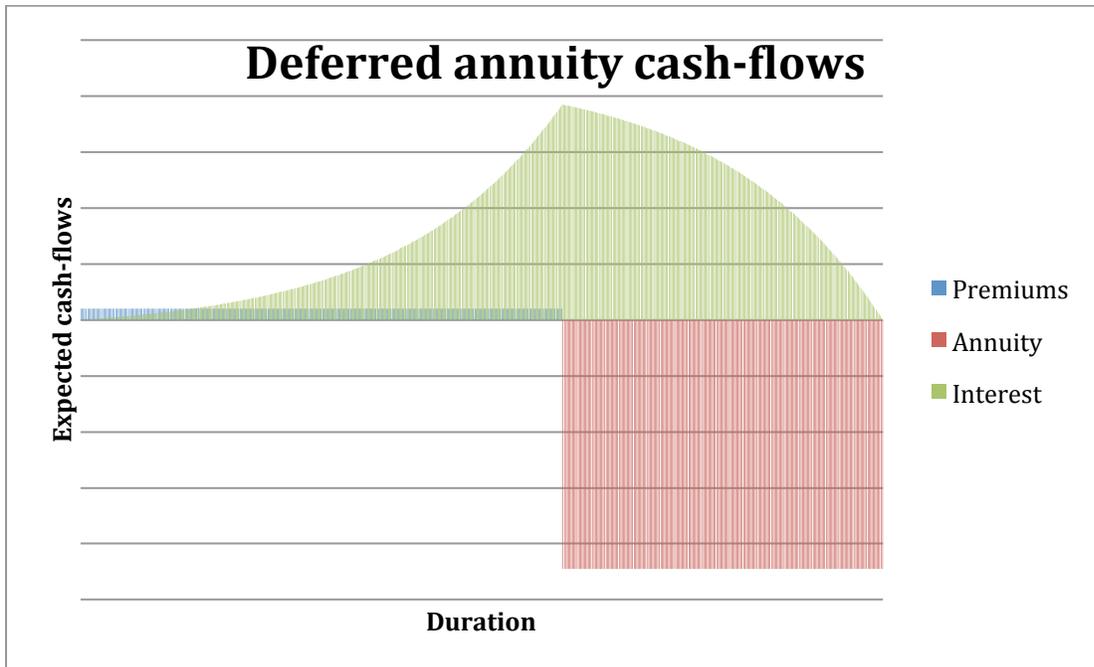
- The above analysis did not assess the level of risk taken on by the fund manager , i.e. there may have been significant risk of under-performance under different circumstances. A longer measurement period should be used. Risk-adjusted measurement (e.g. Sharpe and Treynor measures) should be used.
- the possibility of spurious and/or misleading results if invalid comparisons are made or time periods that are too short are considered (relevant here as well)

## QUESTION 9

*This question overall garnered a spread of marks.*

- i. *This question required no other knowledge other than mathematics of finance, yet a number of candidates were unable to understand the general profile of the cash-flows. A number of candidates also failed to “sketch” as directed, resulting in zero marks.*
- ii. *Pure bookwork question.*
- iii. *Candidates who methodically worked through the LDI approach garnered near maximum marks. This included a few candidates who correctly recognized that an LDI approach is a form of ALM and appropriately tailored an ALM exercise to the context of the question. Of concern, however, is the large number of candidates who did not realise that liabilities do accrue before annuity conversion and that the conversion guarantee sets an interest rate floor. It is also concerning that candidates struggle to discuss how to set asset allocation with limited asset classes excluding specifically derivatives and other possibly preferable asset classes.*
- iv. *This sub-question was well answered, primarily due to the large range of credit-worthy points. A number of candidates, however, mentioned the gearing effect on a swap, without realizing that this would be recognized appropriately under fair value accounting rules.*

i.



ii. Liability Driven Investment (LDI) is the terminology used to describe an investment decision where the asset allocation is determined in whole or in part to a specific set of liabilities . LDI is not a strategy or a type of product available in the market but an approach to setting investment strategy.

iii. Without the conversion rate guarantee:

Prior to annuity conversion, the policyholder has been promised domestic money market rates . Therefore invest in the pure matched asset. Should be no problems even in a frontier market, as long as there is a functioning banking sector.

Post annuity conversion, the policyholder has been promised a level nominal income until death . A combination of government conventional bonds would appear to be the appropriate asset . The level nominal income would depend upon the prevailing interest rates at the time of conversion. Ideally, the assurer could purchase tranches of zero-coupon government bonds to match the annuity payments exactly, or stripped bonds. The required variety and sophistication of government bonds are unlikely to be found in a frontier market, however. Thus the asset selection process would likely follow the process below anyway.

Including the conversion rate guarantee:

The selection of the bonds must closely match the interest rate sensitivity of the annuity payments . Thus a change in the annuity liability values should be closely matched by a change in the value of the bond assets. As the conversion rate guarantees the level of annuity payments and the duration of the annuity payments may be very long, these annuity liability values will be very sensitive to a change in interest rates.

Thus it will probably mean that the portfolio of assets for a, above, should ideally include conventional bonds to help manage this interest rate risk. And thus a, above, is no longer a pure matched position.

It is unlikely that a pure application of immunisation will provide a robust solution.

Better to use asset liability modelling to select the portfolio of conventional bonds. The objective would be  $P[\text{Insolvency}] < \text{Target probability}$  over specified duration horizons. On a stochastic or deterministic iterative basis. Create portfolios combining the two asset classes, vary their weighting over time to determine the optimal asset allocation over time to meet the objective. The modelling will include any practical asset limitations, such as limited government bonds.

- iv. A swap is an agreement between two parties to exchange cash-flows in the future. Practically, the life assurer will deal directly with a financial intermediary, such as an investment bank.

The life assurer can exchange cash-flows from the government bonds it can purchase for cash-flows that are more appropriate for its liabilities. The payments from the bonds would be both coupon and principal repayments. There is usually a large amount of flexibility regarding the profile of the cash-flows received from the investment bank. Although flexibility may cost more. Specifically, the swap market may extend to greater terms than the conventional bond market.

An additional risk that is created, however, is credit risk exposure to the investment bank. This may be mitigated, however, through appropriate posting of collateral.