INSTITUTE OF ACTUARIES OF AUSTRALIA

C1 INVESTMENTS **OCTOBER 2010 EXAMINATIONS**

Marking Guide

Level of difficulty

Question	Units	Knowledge & Understanding	Straight-forward Judgement	Complex Judgement	Total Marks
1 (a)			3		3
1 (b)			5		5
1 (c)				5	5
1 (d)			2		2
2 (a)			3		3
2 (b)		5			5
2 (c)				10	10
3 (a)		4			4
3 (b)		4			4
3 (c)			3		3
3 (d)			4		4
3 (e)				3	3
3 (f)		4			4
3 (g)				3	3
4 (a)			7		7
4 (b)				9	9
5 (a)				6	6
5 (b)			4		4
5 (c)			10		10
5 (d)				6	6
TOTAL		**17**	**41**	**42**	**100**

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Answer all 5 questions.

QUESTION 1 **(15 Marks)**

You are the Actuary to a superannuation fund to which only the employer contributes (the members of the fund do not contribute). The fund is controlled by a Trustee who is responsible for managing the fund and, in particular, for its investment strategy.

The benefits payable from the fund consist of a defined benefit funded by the employer's contributions which is a multiple of 10% of final salary for each year of membership of the fund. The benefits are defined in a Trust Deed. The Deed provides sufficient information to permit the determination of a member's Vested Benefit (the benefit payable upon voluntary termination of service at a particular time) from the data that the fund holds relating to membership and salary.

The employer's contribution strategy is to pay a constant percentage of employees' salaries over their working lifetimes which, together with the assets available, may be expected to provide all benefits as they become payable. The ongoing monitoring of the fund's financial position includes monitoring this level of contribution.

You may ignore tax and expenses in your consideration of the following:

(a) The employer wishes to minimise the future average contributions paid to the fund, expressed as a percentage of total member salaries, subject to some limit on the variability of these contributions; whereas the trustee of the fund is concerned to maintain the fund's solvency (which is measured in terms of the coverage of Vested Benefits by fund assets) as far as is possible. The ratio of the market value of fund assets to the fund's total Vested Benefits may be referred to as the Vested Benefits Index (VBI).

What investment objectives would you recommend to match these requirements? (3 Marks)

(b) Outline how you would develop and use a stochastic asset-liability model to examine the feasibility of achieving the investment objectives that you have suggested in (a) above. Where appropriate, briefly explain how a particular feature relates to the investment objectives. (5 Marks)

(c) Explain how your model could be used on an ongoing basis to monitor the fund's financial position and to develop recommended adjustments to the fund's asset allocation? (5 Marks)

(d) It has been proposed that the employer's contribution be reviewed every three years. How would this strategy affect your answers to (b) and (c) above? (2 Marks)

Solutions Question 1

(a)	- **Upper limit of volatility of future contributions** - **Lower limit on the probability of VBI falling below a specified level** - **Specified level of VBI > 100%**	1 mark 1 mark 1 mark **Maximum 3 marks in total**

The employer's objective of minimising contributions, by itself, would lead to asset allocations which would result in volatile outcomes for both VBI and the level of annual contributions. For this reason, a suitable form for the investment objectives would be:
To minimise the expected level of future contributions, expressed as a percentage of salary, subject to the constraints of:

- An upper limit on the volatility of future contributions; and
- A lower limit on the probability of VBI falling below a specified level (which would be at least 100%) at any time during a specified time period (say the next 10 years).

Before agreeing specific values for the upper limit on (i) contribution volatility, the (ii) lower limit probability for VBI and (iii) the threshold level of VBI which is to be targeted by the constraints, it would be necessary to investigate feasibility by carrying out appropriate asset-liability modelling.

(b)	stochastic dependence of the assets upon the inflation variable stochastic dependence of the liabilities upon the inflation variable mean covariance model or GARCH or other appropriate model investigate the expected distribution of required employer contribution levels (for various efficient asset allocations) investigate the expected distribution of VBI levels (for various efficient asset allocations) determine an investment allocation with an acceptable probability of ongoing solvency	1 mark 1 mark 1 mark 1 mark 1 mark 1 mark **up to a maximum of 5 marks in total**

The fund's liabilities are driven by the members' salaries which will in turn be affected by inflation. Inflation will also affect the levels of investment return from each asset class in which the fund invests. The asset-liability model should therefore be constructed to have stochastic dependence of both the assets and the liabilities upon the inflation variable. Apart from this dependence, it would be sufficient for the liability model to be otherwise deterministic in nature. The demographic analysis of the assumptions for new entrants and exits performed as part of the liability analysis will not be expected to show any inflation dependence.

The asset model used could be as simple as a mean covariance model covering the various asset classes invested in, together with inflation. This would be sufficient to produce useful results; however more sophisticated modelling of equity asset classes, using a methodology such as GARCH, would produce more realistic distributions of outcomes and would be preferred for this reason.

The model could be used to (a) investigate the expected distribution of required employer contribution levels , and (b) the associated expected distribution of VBI levels, for various efficient asset allocations. Based on these investigations an investment allocation (Investment strategy) could be determined by the Trustee which it regarded as producing an acceptable probability of ongoing solvency, subject to payment by the employer of contributions at the recommended rate. This allocation would also need to satisfy the employer's requirement of providing an acceptable trade-off between expected long term cost and expected variability of long term cost.

(c)	periodically running the model with updated fund data	1 mark
	updating the asset assumptions to reflect current and forecast economic conditions	1 mark
	updating the inflation assumptions to reflect current and forecast economic conditions	1 mark
	determine the new expected outcome distribution for VBI	1 mark
	investigate the effect of making changes to the Investment Strategy based on updated data	1 mark
	possible need to seek the employer's agreement to an increase in contribution rate (this is after the model is run)	1 mark **up to a maximum of 5 marks in total**

Once parameters for the investment objectives have been agreed and are finalised, the investment strategy has been agreed and implemented, and the recommended level of employer contributions has been determined, and is being paid into the fund, it is advisable to institute a monitoring regime to ensure that the contribution and investment strategy settings remain appropriate. This could be done by periodically running the model with

updated membership data and asset market values, and after updating the asset and inflation assumptions to reflect current and forecast economic conditions, to determine the expected outcome distribution for VBI, allowing for the then current level of VBI and for the then current level of employer contribution. The distribution should be analysed for the nature and probability of adverse outcomes. Should this investigation reveal deterioration in the fund's position which appears significant to the Actuary or the Trustee, then further investigations could be carried out to investigate the effect of making changes to the Investment Strategy, and the possible need to seek the employer's agreement to an increase in contribution rate could also be investigated. These results can be communicated to the client using, for example, a framework that compares results to pre-agreed KPIs.

(d)	Modelling should simulate such triennial reviews by allowing in the simulation for the employer contribution rate to change at three yearly intervals	1 mark
	distributions of outcomes considered could then include the employer's contributions rate for each of, say, the next four three year periods.	1 mark
	may allow more aggressive asset allocations	1 mark
	appropriate, in these circumstances, for the employer's contribution rate to be assumed to remain at its current level until the next triennial review date.	1 mark **up to a maximum of 2 marks in total**

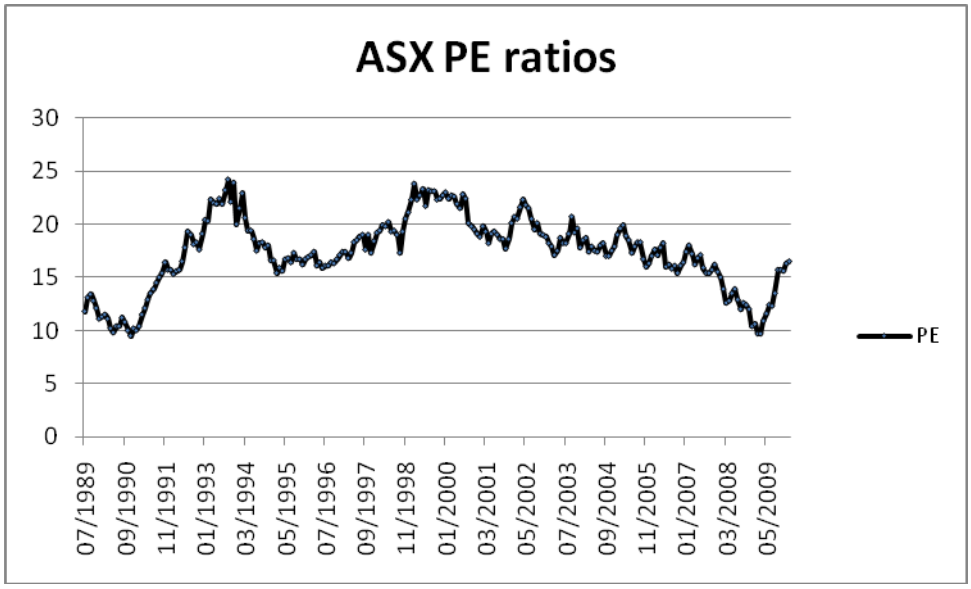
If the employer's contribution level is subject to review every three years, then this could be allowed for in the modelling, which should simulate such triennial reviews and allow in the simulation for the employer contribution rate to change at three yearly intervals keeping in mind that the fund stays within the constraints of the investment objectives at the lowest possible employer cost. The distributions of outcomes considered could then include the employer's contributions rate for each of, say, the next four three year periods.

This type of funding strategy, which allows employer contributions to respond to volatility in asset values in the short term, may provide for greater stability in the VBI. Hence it may allow more aggressive asset allocations.

This regime of triennial review would also have implications for the monitoring process. It would generally be appropriate, in these circumstances, for the employer's contribution rate to be assumed to remain at its current level until the next triennial review date.

QUESTION 2 **(18 Marks)**

The PE ratio (price to earnings ratio) can be calculated for individual stocks or for entire markets. The chart below shows the PE ratio for the ASX All Ordinaries Index, as calculated by Datastream.



(a) Explain how the PE ratio of an equity index may be calculated. Discuss the stationarity of this ratio and the significance of its level at any particular time for the determination of expected returns from investment in that index at that time. **(3 Marks)**

(b) Define the Equity Risk Premium (ERP) and explain how it is related to the PE ratio. **(5 Marks)**

(c) The Global Financial Crisis (GFC) was a period during which market behaviour diverged significantly from usual norms. For each of the following five specific aspects, state what happened during the GFC and outline the implications of this experience for the future construction and use of asset models.

1. **Cross-country equity correlations**
2. **The relationship between equity and currency returns (if you wish you may consider Australia as a specific example of this)**
3. **The relationship between bond and equity returns**
4. **The effect of fiscal stimulus**
5. **The implied level of credit risk of sovereign bonds**

(10 Marks)

Solutions Question 2

(a)	PE ratio of index explained PE ratio is generally stationary index PE is higher than its mean, returns can be expected to be lower than average or index PE is lower than its mean, returns can be expected to be higher than average	1 mark 1 mark 1 mark **3 marks in total**

For an individual stock the PE ratio is calculated as the ratio of the market price of a share in that stock to the earnings per share achieved by that stock. For an index the PE ratio is calculated as the market capitalisation weighted average of the PE ratios of the index's constituent stocks.

Statistical analysis of the PE ratio of a market index demonstrates that the ratio is generally stationary. However in the case of many indices there may be a number of structural breaks in the data, corresponding to major changes in the index definitions, and these breaks generally give rise to changes in the PE distribution of the index in question.

A major consequence of this stationarity is that index PE ratios may be expected to mean revert. This means that if an index PE is higher than its mean at any particular time it can be expected to revert to that mean, thus returns from investment in that index at that time can be expected to be lower than average. Similarly, low PE is an indicator of higher than average expected returns from investing in that index at that time.

(b)	ERP definition: (a) difference between the expected rate of return on equities and the ten year government bond yield (b) ten year government bond yield is taken as representative of a riskless rate of return (c) ERP represents the extra return provided by equities in return for accepting the associated risks ERP is not constant over time, but varies inversely to the market PE Formula for estimating ERP	 1 mark 1 mark 1 mark 1 mark 1 mark **5 marks in total**

The Equity Risk Premium (ERP) is the difference between the expected rate of return on equities and the ten year government bond yield. The ten year government bond yield is

taken as representative of a riskless rate of return, so the ERP represents the extra return provided by equities in return for accepting the associated risks.
The ERP is not constant over time, but varies in a manner which is inversely related to the market PE ratio. Two ways of seeing this are set out below:

- The ERP may be estimated as [(1/market PE ratio) – real government bond yield]

- The ERP may be estimated on the basis that when PE is at its mean level, the ERP is around 5.5% and that PE will mean revert to its average level of 14 over a period of around 5 years. These characteristics of PE ratios are based on historical experience, as well as on some economic theory. Thus ERP = 100(0.055+ (14/PE) ^ (1/5)-1). (When using this second approach the use of any reversion period between 3 years and 10 years and the use of a normative ERP between 5% and 6% should obtain full marks.)

(c)	For each of (1) – (5), item covered	1 mark for what happened 1 mark for implications for asset models **10 marks in total**

1) During the GFC, cross-country equity correlations became much higher than normal. This resulted in diversification benefits of investing in different countries being significantly reduced. The lesson here for the future construction and use of asset models is to remember that equity covariance structures are not stable and to consider stress testing model outcomes for significant increases in correlation from normal levels.

2) In normal times there is no strong link between equity and currency returns, in fact apart from some minor anomalies such as the forward rate bias, currencies can normally be treated as generators of “noise” rather than of return – a view which justifies taking a 100% hedged position. During the GFC however there were large flows of money seeking “safe havens”. This resulted in some countries equity markets and currencies strengthening simultaneously as this “hot money” flooded in. In particular, Australia benefited from this effect at the start of the GFC in 2007 but suffered in the latter part of the GFC in late 2008 when the “hot money” flowed out. At both times, the stock market and AUD-USD rate moved strongly in the same direction. The lesson here is not to rely at times of financial turmoil on currency models derived from considering normal market conditions.

3) During the GFC, not only did equity markets fall, but so did interest rates. Money seeking “safe” investments was directed into bonds, particularly into sovereign bonds and so bond returns became unusually strong. These events support the use of equity models that realistically reproduce bull and bear market behaviour in simulations, such as asymmetric GARCH.

4) At normal times markets are very little affected by government fiscal policy. The GFC, however, gave rise to government decisions to use unusually large fiscal stimuli in an attempt to move economies away from deep recession. These stimuli appear to have been effective. The lesson here is to be aware that models

constructed making no allowance for government intervention in markets may not work so well if large scale intervention takes place.

5) At normal times nearly all countries' government bonds are regarded as risk free. However a consequence of the GFC was that several countries' government bonds have been considered to be at risk of default. The lesson here is that "risk free" investments can occasionally become risky. This is generally not allowed for in modelling but could be catered for in stress testing.

QUESTION 3 **(25 Marks)**

(a) What are the possible causes of consumer price inflation? (4 Marks)

(b) What is the framework within which the Reserve Bank of Australia conducts monetary policy and what tools does it use? (4 Marks)

(c) Describe how the following asset classes can operate as hedges against inflation:
- **infrastructure,**
- **inflation-linked bonds, and**
- **floating rate nominal bonds.**

(3 Marks)

(d) List two other asset classes you might consider as suitable candidates for inflation hedging, providing reasons for your choices. (4 Marks)

(e) In fixed interest management, the break-even inflation rate is the rate that makes the implied real yield on nominal fixed rate bonds equal to the real yield available on inflation linked bonds.

What implications does the break-even inflation rate have for the relative attractiveness of nominal bonds versus inflation-linked bonds?
Are these implications uniform for all nominal and inflation-linked bonds?
(3 Marks)

(f) Name two theories that attempt to explain the relative level of currencies, and briefly explain the role that inflation may have, if any, in the two theories. (4 Marks)

(g) There is a relative shortage of inflation-linked bonds available in Australia. It has been suggested that global TIPS (Treasury inflation-protected securities) could be used as suitable proxies for funds aimed at Australian retirees. What issues would these funds need to take into account before using global TIPS in this way? (3 Marks)

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Solutions Question 3

(a)	Answers can be structured as generic causes with examples – or as a series of specific examples. Any of - ▪ imbalance between demand and supply, ▪ cost push, ▪ demand pull, ▪ loose monetary policy, ▪ loose fiscal policy ▪ exogenous causes such as natural disasters	**1 mark each up to maximum of 4 marks total**

Inflation generally arises because of an imbalance between demand and supply. There are both endogenous causes and exogenous causes of inflation.

Endogenous causes include:

- Cost push inflation – Prices rise as a result of increases in product input prices to the extent that producers can pass them on. Input prices include labour costs (wages). A depreciating currency can also give rise to imported inflation as imported goods become more expensive and consumers cannot replace or move slowly to replace them with cheaper local substitutes.

- Demand pull inflation – There is a surge in demand that supply can't satisfy. Loose fiscal policy may fuel demand either from the Government as a purchaser or through decreases in taxation that increase take-home pay. Loose monetary policy reduces the cost of debt and this may increase demand.

Exogenous causes include things such as oil price shocks, natural disasters such flood, drought, cyclones etc. Natural disasters limit supply in the short term. The introduction of the GST in the late 1990s was a policy change that gave a one-off boost to prices that producers were allowed to pass on (undue profiteering was monitored).

(b)	framework is inflation targeting with brief explanation	1 mark
	Inflation target of 2-3%	1 mark
	Tools	
	(i) setting the official cash rate	1 mark
	(ii) open market operations	1 mark
	with brief description of what these are should be provided	**Total 4 marks**

The Reserve Bank of Australia (RBA) operates within an inflation targeting regime. Under the regime the RBA aims to keep inflation in a range of 2-3% p.a. over the economic cycle. This is regarded as "a rate of inflation sufficiently low that it does not materially distort economic decisions in the community". The target is a forward looking medium-term average target "rather than a rate …. that must be held at all times". The RBA aims to influence inflationary expectations over the medium term and the target serves as an "anchor "to those expectations.

For these reasons the RBA focuses on underlying rather than headline inflation. Underlying inflation better reflects the forces at work in the economy.

The tools the RBA uses are:

- Setting the official cash rate – The RBA relies on both the announcement effects following publication of its monthly meeting decisions and reasoning and the fact that movements in the cash rate are passed through to capital market interest rates, and

- Open market operations, which are run by its Domestic Markets Department, to keep cash rates at the announced level – The RBA controls the volume of the "exchange settlement funds" set aside to settle transactions between financial intermediaries and the cash rate is the rate charged on overnight balances between them. Excesses or deficiencies in exchange settlement funds will cause the banks to shed or build up funds, with consequential effects for the economy.

(The RBA has provided the following chart to describe how the process works:

Quotes are taken from http://www.rba.gov.au/monetary-policy/about.html#the_monetary_policy_framework.)

(c)	Infrastructure ability to index concessions ILBs description of how indexation works FRBs movement in cash rate or equivalent 90/180 day swap rate with inflation	 1 mark 1 mark 1 mark **3 marks total**

A hedge against inflation might operate:

- **Directly** by a direct response to changes in inflation by an embedded feature of the asset class or **indirectly** such that inflation affects another measure that feeds into the asset class, or
- On the total return on the asset class over the holding period or on the pattern of returns throughout the holding period.

Infrastructure

Certain types of infrastructure are subject to operating concessions that allow tariffs to increase with inflation either directly or by price regulators recognising inflation as an input into price setting. Where the latter applies, it may be constrained by limits on the RoE earned by operators. Examples include road tolls or transport concessions. Of course, expenses would have to be kept within inflation as well. Capital gains are also possible.

Inflation Linked Bonds (ILBs)

ILBs are an example of an asset class with a direct response to changes in inflation by an embedded feature of the asset class. ILBs come in three forms – capital indexed, interest indexed and annuity style. This answer will concentrate on capital indexed ILBs under which the issued capital is indexed with inflation (generally on a two quarter lagged basis). The coupon rate is then applied to the inflated capital, so that both the coupon amount and the capital repaid will maintain their real value (except to the extent of any differences introduced by the lag).

In terms of intra-period returns, their inflation protection will depend on market real rates of interest from time to time – if above the purchase real rate, then capital values will fall; if below it, then capital values will increase.

Floating Rate Bonds (FRBs)

FRBs carry a coupon which is the sum of a cash equivalent rate (usually the 90 or 180 day swap rate) and a margin that reflects the issuer's credit standing.

Their attraction as a hedge against inflation depends on the extent that the cash equivalent rate moves with inflation. Under inflation targeting, the official cash rate will generally be lifted in response to expectations that inflation is increasing and vice versa. Whether this causes the cash rate or equivalent 90/180 day swap rate to move in lock-step with inflation is not assured but is likely there will be some compensation.

(d)	Direct Property – reason: rent increases or capital values Listed shares potential for economic growth to affect earnings and dividends or flowthrough of earnings growth to capital values via PE Gold – reason: hard currency or not able to created by central banks.	1 mark 1 mark for reason 1 mark 1 mark for reason 1 mark 1 mark for reason **up to a maximum of 4 marks total**

Direct Property – Income returns on property will keep pace with inflation to the extent that rents on the underlying property do so. This will depend on the tenancy market at the time and how well situated and appointed the individual property is relative to its competition, both in terms of the initial rent and the rent escalation written into the lease. Some rent clauses reflect inflation directly; others have fixed rate increases written into them. Turnover rents are uncommon but, if available, may reflect economic growth. As with listed shares, if capital values grow over time, then they may also keep pace with inflation.

Listed Shares

The arguments for **listed shares** providing a hedge against inflation depend on:

- Company earnings growing with the economy – While, to some extent, inflation lags growth, earnings growth and inflation can be regarded as companion phenomena; earnings will affect dividends, and thus the income component of the return from equities, to the extent that pay-out ratios allow the pass-through of earnings growth, and

- The potential for capital growth over the holding period through the PE ratio raising the share price as earnings grow. If it results i.e. PE ratios have not compressed more than earnings have risen in real terms, it will lift end-of-period returns to ensure (hopefully) that the end value will have kept pace with or exceeded the inflation adjusted value of the initial investment.

Both offer indirect inflation coverage but neither is assured. It is also necessary to point out that the prices on the exchange reflect the balance of demand and supply for a particular stock and it may or may not reflect economic or company growth at any particular time.

At a sector level, the sharemarket will represent only a portion of total enterprise within the economy or of the producers of goods and services that are monitored for inflation. The larger the listed equities' share, the more likely the broad share index will reflect the economy as a whole or match the CPI basket.

Gold - Excessive quantitative easing and / or extended periods of easy monetary policy will increase the volume of fiat money. Gold has historically been viewed as a form of hard currency that cannot be created by central banks thus may be expected to hold its real value during inflationary periods.

(e)	need to compare expected and break-even inflation indicate which of ILB vs. nominal bond to buy depending on above comparison Limitations - many different break-even inflation rates depending on combination of maturity and credit rating.	1 mark 1 mark 1 mark for any sensible limitation **Total 3 marks**

The break-even inflation rate is the rate (i), when deducted from the yield to maturity on nominal fixed rate bonds (y), equals the real yield on inflation-linked bonds (r): $i = y - r$. This formula is for information only, no marks are to be awarded for writing the formula because the formula is provided in the question.

Break-even trading requires the investor to form expectations of inflation over the balance of the term of the bond. These expectations will be formed against the back-drop of current inflation, the investor's reading of the forces driving inflation and the extent that they will persist.

If the investor's inflation expectations is more than the break-even inflation rate over the term, then the investor should buy inflation-linked bonds because ILBs will outperform nominal bonds. ILBs real yield will be greater than that implied by the nominal bonds.

Conversely, if the investor's inflation expectations is lower than the break-even inflation rate, then the investor should buy nominal bonds because nominal bonds will outperform ILBs. The inflation-linked real yield will be lower than the implied nominal bonds real yield.

Qualifications

There will be many different break-even inflation rates depending on the combination of maturity and credit rating.

Break-even analysis needs to be dynamic because both nominal and real yields are traded in the market and hence the break-even inflation rate changes frequently.

(f)	purchasing power parity (PPP) - currency rates reflect inflation differentials interest rate parity (IRP) - any central bank inflation targeting will likely cause interest rates to be moved in response to expected inflation	1 mark 1 mark for reason 1 mark 1 mark for reason **Total 4 marks**

Two theories for currency differences are **purchasing power parity (PPP)** and **interest rate parity (IRP).**

PPP holds that, in equilibrium and ignoring transaction expenses, a given basket of goods should cost the same in different countries. The "real" exchange rate should therefore, reflect inflation differentials between countries. The evidence is regarded as equivocal and, if PPP does apply, then it is likely to apply over the medium to long term.

IRP holds that currency rates reflect interest rate differentials between countries. To the extent that inflation targeting is used between countries, then interest rates may also move in response to expected inflation. Again, if IRP applies, it is likely to apply over the medium to long term.

(g)	how well matched inflation in Australia is to that in the countries issuing the TIPs currency movements disturbing the effectiveness of the hedge difference in the real rates of interests	1 mark for each reason **Total 3 marks**

To use TIPS to hedge Australian inflation as a proxy for Australian would require the fund to take a view on:

- How well matched inflation in Australia is to that in the countries issuing the TIPs.
- Whether currency movements will disturb the effectiveness of the hedge (the fund might have regard to PPP and IRP in this respect).
- The fund will have to accept any difference in the real rate of interest in the foreign TIPs versus the real rate of interest in Australia.

QUESTION 4 **(16 Marks)**

Your brother is a member of an Australian defined contribution superannuation fund. He is currently in the Fund's default offering (which is also the Fund's Aggressive option). Legislation has been introduced to require all funds to change their default offering to a low cost fund within the next 12 months. The Fund has contacted him with an outline of its planned new offering. (See below for a summary of the two offerings.) He has been advised that, should he not indicate a preference between the two offerings, he will be moved into the new default offering as required by the legislation. A telephone intra-fund advice service will be available that will provide more detail on differences between the two offerings but will be unable to recommend which fund he should choose. He has come to you for advice. Assume you have the necessary financial planning licence that entitles you to provide such advice.

Strategic Asset Allocation (SAA)	**Current Default**	**New Default**
Australian listed shares	25%	30%
Australian direct property	5%	
International* listed shares	5%	35%
International direct property	10%	
International * REITS		5%
International listed infrastructure		5%
International unlisted infrastructure	10%	
International hedge funds	10%	
International private equity	10%	
Growth	***75%***	***75%***
Australian fixed interest**	5%	10%
International fixed interest**	5%	5%
International inflation linked bonds**	5%	5%
Global credit	5%	
Cash	5%	5%
Defensive	***25%***	***25%***
Total	**100%**	**100%**

* International means ex-Australia. **Government and Government equivalent.

The new default will be invested entirely in indexed funds whereas all exposures are actively managed in the current default and the hedge funds exposure is all in hedge funds that use a global macro strategy. Both defaults will be managed to the SAA within a rebalancing tolerance.

Foreign currency exposures are unhedged for growth assets and 100% hedged back to the Australian dollar for fixed interest (including credit).

(a) Discuss the differences in strategic asset allocation and management style for the two offerings (i.e. current default and new default). Explain the implications of these differences for investment returns in the future. (Ignore, for this part, any implications that arise from a significant number of members ending up in the new default offering). (7 Marks)

(b) Of the current total membership, 10% chose the Aggressive Option and 70% made no choice so defaulted to the Aggressive Option giving a total of 80% of the total membership in the Aggressive Option. The Fund's management is considering the implications of similar percentages moving to the new default offering i.e. the low cost fund. If necessary, the Fund's management may contact the regulator for special consideration (which is allowed under the new legislation).

What might these implications be and what sort of special consideration leeway would you anticipate the fund requesting? (9 Marks)

Solutions Question 4

(a)	Differences – unlisted growth exposures exist in OLD but no more unlisted growth exposures in NEW – total property exposure falls between OLD to NEW, or Direct property exposure for Australia falls to zero in NEW – all non government credit risk is reduced to zero in NEW – Active management in OLD vs. Passive index management in NEW. Implications – Statement that performance will differ in future between OLD and NEW – Reasoning for performance difference being more exposed to listed equity in NEW – different liquidity: NEW will be more liquid – Old is more diversified – Old is more expensive (owing to active management) – more problems in OLD in ensuring inter-generational equity – OLD has ability to exploit risk-return imbalances between asset classes through the presence of global macro hedge funds	1 mark each up to maximum of 7 marks total **Total 7 Marks**

The current default offering will be called OLD and the proposed new offering will be called NEW. The differences between OLD and NEW can be summarised as:

- Strategic asset allocation
  - **Australian growth assets** - OLD includes direct property (5%); NEW replaces direct property with more listed shares
  - **International growth assets** – OLD includes international direct property (10%), international unlisted infrastructure (10%), international hedge funds (10%) and international private equity (10%): NEW replaces them with more international listed shares
  - **International defensive assets** – OLD allows for credit; NEW replaces credit with more Australian fixed interest

- **Currency** – there is no difference in foreign currency exposures between OLD and NEW because % in International remains the same.

- Management style
  - **Active vs. passive** - All asset classes are managed actively for OLD; all asset classes are managed passively (indexed) for NEW
  - Both seek to maintain the SAA over time within agreed tolerances but OLD has **ability (up to 10% of total exposure) to exploit risk-return imbalances between** asset classes through the presence of hedge funds using a global macro strategy.

The implication of all differences combined is that the performance of the two funds will differ through time.

In general, should listed equity markets accelerate relative to unlisted investments, NEW should outperform (on a gross of fees basis) but, if the listed equity markets should correct significantly on a relative basis, OLD should outperform.

This would result from the greater diversification in growth exposures in OLD. This diversification has various sources

- the mix of listed and unlisted assets (reported unlisted asset valuations generally lag listed asset valuations and are generally less volatile)
- the correlation between listed and unlisted assets will be less.
- the various asset types that make up the two exposures (OLD has more variation in its make-up with specific additional allocations to property, infrastructure, hedge funds and private equity)
- the likelihood of more diversification resulting from active management (assuming a multi-manager portfolio) than in passive management
- the back-ended return pattern of private equity.

The unlisted exposures in OLD are likely to produce less volatile reported returns, resulting from the appraisal-based valuation regime and less frequent trading, but will also reduce OLD's liquidity relative to NEW. Unlisted property, infrastructure and private equity are lumpy assets and cannot be as easily sold as listed securities.

Private equity also makes it harder to ensure equity between generations as much of the return can be back-ended. The members who receive large, later returns will not necessarily be those who funded the exposures. Maintaining the desired exposure to private equity can also be difficult given its partly paid structure, and can create liquidity problems

Generational equity can also be complicated by unlisted property and infrastructure if liquidity needs change and sale at cyclically low prices is required. Current members may incur the greatest return impact.
Return smoothing to address issues of inter-generational equity is still being used by some funds. However, this method can create as many problems as it solves and is not a perfect mechanism.

The active management in OLD will result in higher investment costs than in NEW, and perhaps significantly so for the unlisted assets (private equity and hedge funds in

particular which usually attracts a 2+20 fee structure). Active management is justified if total returns (after tax and expenses) from it exceed passive returns by more than the active fee spread. In addition, transaction and maintenance costs will be higher for the unlisted assets.

(b)	Identify requirement for sales of unlisted assets and global credit	1 mark
	actively managed equity and fixed interest funds would need to be transitioned into index funds	1 mark
	recognise that some listed shares will be commonly held by active and index fund	1 mark
	identify problem with selling unlisted assets – pricing, or – liquidity	1 mark
	identify problem with selling private equity asset – treatment of future private equity obligations, or – loss of value uplift, or – discounts for secondary transactions	1 mark
	identify that costs and/or tax will be incurred	1 mark
	identify possible problems for other offerings of the fund	1 mark
	special consideration requested – lengthy transition period – tax relief	1 mark 1 mark
	recognising systemic effects	1 mark **up to maximum of 9 marks total**

If all defaulting members (70% of the Fund's membership) or a significant share of them defaulted into NEW:

- The unlisted and the credit assets would need to be sold, and
- The actively managed equity and fixed interest funds would need to be transitioned into index funds.

If various asset class portfolios were held in common with other offerings in the Fund's stable of funds, e.g. less aggressive funds, then they may be natural buyers of the assets. They will, however, be much smaller funds – comprising only 20% of members – and are unlikely to have sufficient scale to absorb the assets. Moreover, they may not have sufficient scale to maintain their own holdings in them given the scale benefits they have enjoyed by co-investing with the Aggressive fund. This suggests a market-based sale of some order would be required.

The Fund will need to consider whether current market conditions are propitious for selling the unlisted assets. Even if they were so, the prices received might also be affected by trying to move significant volumes into the market at the one time. A staged sale is likely to be preferable.

With private equity, consideration would need to be give as to how far the underlying managers were into their programs. The Fund will have committed to a certain level and may be obligated to meet future calls. Likewise, there may be a latent and significant uplift in values the fund would forgo by exiting now. While it may be possible to sell its interests on the secondary market, private equity secondaries usually trade at hefty discounts.

The same applies to the listed assets but to a lesser degree. All index stocks and securities in the active portfolios will continue to be held in NEW, but in different proportions. Only off-index assets will require complete disposal.

Even if the various sales and portfolio rebalancing could be effected, they would come at a significant one-time cost to members and net proceeds would be reduced by capital gains tax.

At a systemic level, if defined contribution funds as a whole were in the same position, there could be a severe market dislocation occasioned by them all moving to sell assets and transition portfolios. This would inevitably have price effects.

The Fund could then petition the authorities to allow a lengthy transition period over which to conduct the transfer to the new portfolio structure, not only because of the potential effects for the Fund but also for capital markets as a whole, and to see whether some form of tax relief would be available given the effects would flow directly from a change in Government policy.

QUESTION 5 **(26 Marks)**

You are an investment advisor to the Board of Trustees of a defined benefit superannuation fund for workers in an Australian retailer. There are 12,000 members in this superannuation fund between the ages of 18 to 40 years. The fund has $400 million of assets under management. The fund only invests in equities, bank bills of up to 12 months maturity and cash. Currently the assets are split into 40% in actively managed Australian equities, 30% in bank bills and 30% in cash. The assets are managed by one fund manager. The Board believes the portfolio is currently too conservative in its risk-return profile relative to the Board's asset allocation policy.

However, the current global climate is making it difficult to identify suitable value stocks to add into the portfolio. The recent full-year reporting season in August was marked by most companies reporting higher statutory profit, but with lower revenue figures. In other words, companies have made higher profit due to cost-cutting, rather than business growth.

You are now drafting a report for the Board of Trustees as part of the periodic review of the fund's current investment position and to devise a strategy for the upcoming year. You have access to a recent actuarial report by the fund's Actuary into the liabilities and contribution rate for the fund.

(a) Explain how you would assess the superannuation fund's investment performance. (6 Marks)

(b) Explain how the current climate described above of "companies reporting higher statutory profit, but with lower revenue figures" may give rise to stocks which meet the quantitative characteristics of value stocks without being a value stock for investment purposes. Ensure your answer specifies the key quantitative characteristics of value stocks. (4 Marks)

(c) You have identified a small sample of stocks fitting the key quantitative characteristics of value stocks. You are now conducting further research into these companies. Give five items you would investigate further to determine whether to include these companies into the portfolio, with a reason as to how each item of information is relevant. (10 Marks)

(d) Explain three key factors you would consider in managing the portfolio in the coming twelve months in order to specifically meet the fund's long-term objectives as suggested in (a) above. (6 Marks)

Solutions Question 5

(a)	Solvency of fund Investment returns of the fund Investment returns of the individual asset classes Attribution analyses of investment performance	1 mark for identifying aspect 1 mark for reasoning as to why the aspect is important **up to maximum of 6 marks total**

The following aspects of the fund may be reviewed for the purpose of assessing the fund's performance over the past year :

- **Relative position of fund assets and fund liabilities**. The fund should be reviewed to ensure it currently is in a solvent position, even though the liabilities technically do not need to be met in the short term. Any change in the VBI can be analysed as to whether this is due to changes in investment related factors or non-investment related factors such as an employer contribution holiday.

- **Investment returns of the fund over the past year relative to the benchmark.** The fund's performance may be compared against a relevant benchmark and other funds to determine if the managers have performed well over the year

- **Investment returns of the individual asset classes.** The fund's performance may be due to the level of exposure to a particular asset class which has performed above or below its normal trend.

- **Attribution analyses of investment performance.** It would be useful to attribute how much of the fund's performance is due to (a) its tactical asset allocation i.e. conservative stance relative to the Board's asset allocation policy, (b) value added by the active management of the Australian equities allocation. Many well-timed transactions (buying assets before it significantly appreciated in value or selling assets before it drops in value) will add significant value. Alternatively, the fund may have underperformed due to excessive trading leading to high transaction costs, without much corresponding increase in value.

(b)	key quantitative characteristics of **value** stocks are EPS, dividend yield and P/BV ratio recognising and explaining the effect of	1 mark each value characteristic up to max 2 marks

	falling revenue on future net profit or EPS	1 mark
	recognising and explaining the flow-on effect on future dividend yield	1 mark
	recognising and explaining how current prices already reflect future expectations of lower net profit or EPS	1 mark
	recognising and explaining how after future lower net profit or EPS materialises in the financial statements, the stock may not meet the key quantitative characteristics of value stocks	1 mark
		up to a maximum of 4 marks total

Companies may be identified as being value stocks without being one for the following reasons :

- A company's stock price falls relative to its financial metrics such as EPS, dividend yield and P/BV ratio due to the market expecting the company to perform weaker in the future.
- The expected weaker future performance is due to the falling revenue trend continuing. Eventually the company cannot further cut its costs to boost or even maintain its profit margins, so its net profit and EPS will experience a slower growth, become steady or fall.
- As company profit reduces, this will reduce dividends if the company dividend payout ratio is kept constant.
- Sufficient investors have perceived these future events and responded by selling the stock and thus reducing the current stock price before the weaker future performance will have been reported in the company's financial statements.
- Investors who buy the stock now because the stock appears cheap using the key quantitative characteristics of value stocks i.e. EPS, dividend yield and P/BV ratio will face an earnings downgrade in the future. As company profit reduces, this will reduce dividends if the company dividend payout ratio is kept constant. The outcome could be that the stock will no longer appear cheap on a value basis.

(c)	Seven items are listed below. • nominating an item • reason or explanation of relevance of item	 1 mark 1 mark **up to a maximum of 10 marks total**

The following information may prove useful in assessing the company's value :

- **Management quality**. Company management with a good track record are more likely to weather poor economic conditions and deliver outperforming returns for their shareholders.
- **Sector/industry outlook.** Companies belonging to resilient sectors/industries may be better positioned for growth. These may be due to the government providing financial and strategic stimulus, general public behaviour or international trading activity propping up the sector/industry.
- **Geographic exposure/diversification.** Companies with business exposure to the high growth Asian region, for example, are potentially more resilient to the global economic slowdown than those with business exposure to the lower growth geographies e.g. North America or Europe.
- **Business structure.** Certain business segments are likely to recover faster than other business segments. Favourable structural factors of a particular industry such as high barriers to entry, will enable profit margins to be preserved or quickly restored. Alternatively, companies with businesses in defensive sectors, such as consumer staples and utilities, may weather the current conditions better than cyclicals.
- **Capital structure and equity base/dilution.** Over the past two years, companies have dramatically restructured their balance sheet by cutting debt. However, companies with a very large equity base will grow slower due to massive earnings dilution. Their valuation may be reflected accordingly.
- **Future write-downs of underperforming businesses and assets.** Some companies are currently appearing to be undervalued as they have not written down their underperforming assets or goodwill. The market may anticipate this, and hence attach a lower share price to them now.
- **Point in business cycle.** The investor should consider whether a company's profit margins are at cyclical or structural highs. A low PE valuation may reflect earnings that have benefitted from a cyclical or structural extreme in profit margins. Mean reversion of earnings will occur as profit margins normalise.

(d)	Four items are listed below. • nominating an item • reason or explanation of relevance of item	 1 mark 1 mark **up to a maximum of 6 marks total**

The following factors are worth considering:

- **Members' age profile and sponsoring company risk-return preference**. The members in this superannuation fund are generally many years away from retirement. Hence, the portfolio can be weighted more towards higher risk assets such as equities.
- **Cash levels**. The current economic environment is uncertain, the fund may wish to keep a significant amount of cash so that switching into equities and longer term bank bills can quickly occur as investment conditions change. This is especially the case for when the global economy recovers and equities are back in favour.
- **Portfolio diversification within asset class and sectors.** The portfolio must be sufficiently diversified to prevent accumulation of risks, which may lead to the fund suffering a significant loss should a particular stock drop in price. 60% of the fund is in cash or bank bills which means that assessment of the credit risk of banks and other deposit taking institutions will be important. Diversification of exposure for cash deposits and bank bills will be required so that the fund will not be unduly affected by failure of any single deposit taking institution or deposit taking sector.
- **Portfolio size and manager arrangement.** As the portfolio increases in size, it may justify the need for specialist managers to oversee the portfolio's assets. The fund may consider having a specialist cash and bank bill manager, or specialist equity managers such as small cap, value or index managers.

END OF PAPER