

EXAMINERS' REPORT

November 2011 examinations

Subject F105 — Finance and Investment Fellowship Principles

INTRODUCTION

The attached report has been prepared by the subject's Principle Examiner. 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

Examiners' comments:

This was a straightforward bookwork question in which most candidates performed well. In part (ii) some candidates elaborated about the role of the clearing house rather than focusing on the margining process, resulting in some straightforward marks being lost.

Specimen Solution:

i.

- Unit of trading.
- Exact details of the underlying asset – i.e. type and quality.
- Size of the contract.
- Delivery arrangements – i.e. place of delivery and month of delivery.

ii.

- Margin is the collateral that each party to a futures contract ...
- ... must deposit with the clearing house.
- It acts as a cushion against potential losses, ...
- ... which the parties may suffer from future adverse price movements.
- Initial margin is payable once the contract is entered into.
- The balance in the margin account is adjusted daily ...
- ... to reflect gains and losses on the futures contract.
- Where losses exceed a certain level, ...
- ... the investor is required to deposit a further margin (i.e. variation margin)
- The system makes it unlikely that an investor will default.
- A similar system of margins between the investor and the intermediaries of the transaction (e.g. broker, clearing house member) will make default with the clearing house unlikely.

iii.

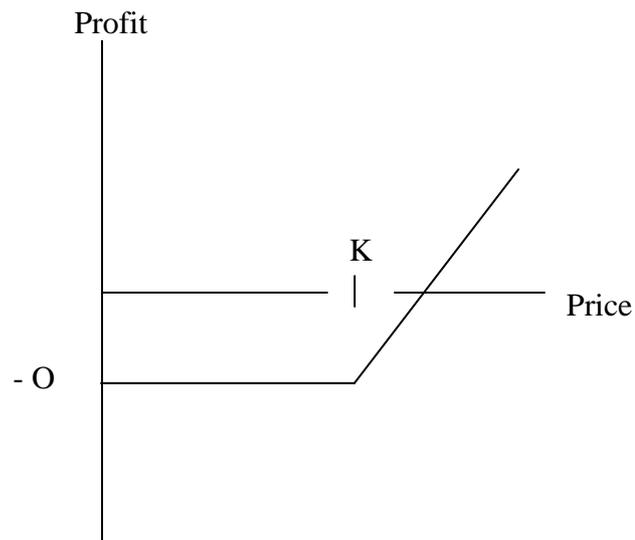
- The mine could buy a call option ...
- ... giving it the right ...
- ... but not the obligation ...
- ... to buy BRL10 million at a specified exchange rate in 6 months' time.
- This will offer the mine protection against a strong BRL in 6 months' time ...
- ... i.e. exercise the option if $BRL > ZAR$ strike...
- ... while still allowing the mine to benefit from a weak BRL at that time ...
- ... i.e. option expires worthless if $BRL < ZAR$ strike.

iv.

- The payoff for the mine who purchases a call option and exercises the option can be expressed as:

$S_T - K - O$, where:

- K is the exercise (strike) price
- S_T is the price of the underlying stock at expiry (maturity)
- O is the price of the call option – the option premium



QUESTION 2

Examiners' comments:

This question was generally poorly answered.

In Part (i) no points were awarded for listing disadvantages of currency swaps that were either not properly explained or that were trivial. For example, no points were awarded for simply stating that exposure to market or currency risk is a disadvantage of using currency swaps.

Part (ii) was generally answered better than the other parts of the question. Most students recognised the equivalence of a currency swap to a position in two bonds. However a fair number of students missed the exchange of principal that typically occurs at the end of the life of a currency swap. Some students also seemed to have a problem identifying the times at which the swap cash flows occurred within the remaining 15 month period.

Part (iii) was the most difficult part of the question. Some students seemed to confuse forward (interest) rate agreements (FRAs) with currency forwards. A significant number of students simply grouped the bond cash flows determined in Part (ii) and their corresponding present values into two forward contracts without performing any additional calculations. This group of students failed to answer the question completely since explicit currency forward rates were required in order to corroborate the results in Part (ii).

Specimen Solution:

i.

The disadvantages of using currency swaps include:

- the extra cost of the bid-offer spread, ...
- ... compared with a straight spot currency transaction.
- removing the possibility of favourable currency movements (i.e. market risk).
- the introduction of counterparty credit risk.
- mismatching real liabilities, ...
- ... by eliminating purchasing power parity protection against unexpected inflation differentials
- the difficulty of hedging unknown future income.
- they can only easily hedge a level income stream.
- they are only available on fairly large principal amounts.

iii.

Valuing the swap as a position in two bonds – the swap involves exchanging:

- rand interest of R200 x 0.14 = R28 million for ...
- ... dollar interest of \$30 x 0.1 = \$3 million; and ...
- ... the principal amounts at maturity.

Value of the ZAR bond underlying the swap:

$$28 \times (1.12)^{-0.25} + 228 \times (1.12)^{-1.25} = \text{R}225.103 \text{ million}$$

Value of the US\$ bond underlying the swap:

$$3 \times (1.08)^{-0.25} + 33 \times (1.08)^{-1.25} = \$32.916 \text{ million}$$

Hence, the value of the counterparty paying US\$ is therefore:

$$(225.103 \times 0.1429) - 32.916 = -\$0.758 \text{ million}$$

iii.

Valuing the swap as a portfolio of forward contracts:

Continuously compounded rate interest rates (δ): ZAR = 11.333%; US\$ = 7.696%

The 3-month and 15-month forward exchange rates are:

$$0.1429 \times e^{-(0.11333 - 0.07696) \times 0.25} = 0.1416$$

$$0.1429 \times e^{-(0.11333 - 0.07696) \times 1.25} = 0.1365$$

The values of the two forward contracts for the counterparty paying US\$ are:

$$(28 \times 0.1416 - 3) \cdot e^{-0.07696 \times 0.25} = \$0.9454 \text{ million}$$

$$(28 \times 0.1365 - 3) \cdot e^{-0.07696 \times 1.25} = \$0.7468 \text{ million}$$

The value to the forward contract corresponding to the exchange of principal:

$$(200 \times 0.1365 - 30) \cdot e^{-0.07696 \times 1.25} = -\$2.451 \text{ million}$$

Hence, the total value of the swap is: $\$0.9454 + \$0.7468 - \$2.451 = -\0.758 million

QUESTION 3

Examiners' comments:

This was a poorly answered question where most candidates struggled to obtain even half of the marks available. In part (i) most candidates presented detailed descriptions about the canons of lending whereas the focus should have been specifically on the fundamentals of the ratings' agencies approach to credit rating, a topic which is well covered in the core reading. Few candidates were able to mention the risks relating to the underlying bonds and even fewer showed a deeper understanding of the specialist asset class under consideration, hence failing to pick up the marks available in relation to the CBO. In part (ii) the majority of answers were disappointing and candidates struggled to pick up marks in a question which required higher level thinking and a deeper understanding of the regulatory issues at stake.

Specimen Solution:

i.

In relation to the underlying bonds:

- Economic, and ...
- ... political risks of the countries involved.
- Global, and ...
- ... local industry risks.

In relation to the individual issuers:

- Competitive position of issuers.
- Downside risk vs. Upside potential.
- Quality of profitability vs. EPS growth.
- Cashflow generation vs. Book profitability.
- Forward looking analysis.
- Strategy, management track record and risk appetite.
- Capital structure and financial flexibility.
- Correlations between fortunes of issuers.

In relation to the CBO:

- Extent of loan collateralisation ...
- ... was it over-collateralised?
- Particulars of debt covenants of individual bonds
- Coupons promised in each of the three tranches, and ...
- ... extent of risk spread between tranches.
- Any earmarked reserve funds.
- External credit enhancements, e.g. ...
- ... guarantees from investment bank.
- Liquidity support/backstop arrangements

ii.

Investigate:

- Remuneration of rating agencies, in particular, ...
- ... are they paid for their ratings by the issuers potentially giving rise to conflict of interest considerations?
- Suitability of models for rating complex debt structures, in particular, ...
- ... correlations between components of securitised debt tranches.
- Compliance costs, and ...
- ... oversight costs of stricter regulation.
- Other bond failures ...
- ... is this a once-off among AAA-rated bonds, or ...
- ... have there been many more defaults than would be expected?
- Causes of this failure as a basis for prescribing future regulation.
- Expected benefits from stricter regulation should outweigh the costs.

QUESTION 4

Examiners' comments:

This question was answered reasonably well. However, in Part (i) many students did not identify all the stakeholders to a statement of investment principles who are the trustees, investment managers and investors.

Specimen Solution:

i.

The requirement to have a Statement of Investment Principles ensures:

- the investment manager, trustees, and investors ...
- ... have a clear understanding of the investment strategy.
- trustees focus on their responsibilities towards investment
- trustees and investment managers understand and explain deviations from the strategy.

ii.

A "Statement of Investment Principles" should set out:

- who is taking which decisions, ...
- ... and why this structure has been selected.
- the fund's investment objective.
- the fund's planned asset allocation strategy, ...
- ... including projected investment returns on each asset class, ...
- ... and how the strategy has been arrived at.
- the mandates given to all advisers and managers, ...
- ... i.e. details of the investment objective, benchmark(s), allowable risk etc
- the managers' approach in attempting to achieve the objective.
- clear time scales of measurement and evaluation.
- the nature of the fee structures in place for all advisers and managers, ...
- ... and why this set of structures has been selected.

QUESTION 5

Examiners' comments:

This was reasonably answered, but could have been done much better given its bookwork nature.

Part (i) showed that students either do not properly understand EMH or were careless with their answers. Most candidates made the statement that it is not possible for active managers to beat the index hence a passive strategy is better. This statement is both incomplete and incorrect: incomplete in the sense that over short periods active managers might beat the index by luck, and incorrect in the sense that it ignores the level of systemic risk adopted by the active manager. Few noted that this is a highly developed country, so the market in the top 80 shares is very likely to be efficient.

Part (ii) was well answered in general. Some candidates got sidetracked with comments about "core-satellite" approaches to beat the index (when the mandate was to track it), and some suggested investing in a (competitor's) tracker fund.

Specimen Solution:

i.

- According to the efficient markets hypothesis, it is in any case impossible to systematically outperform the index, except by investing in securities that involve a higher degree of risk.
- Hence a passive investment strategy is appropriate if the particular market is believed to be efficient, which is likely as the index is in relation to a highly developed country.

ii.

Full replication:

- All 80 of the shares in the index are held in proportion to their index weightings.

Advantages:

+ Tracking error should be minimised (before taxes, expenses).

Disadvantages:

- Need a large fund to justify using this method.
- Expenses and tax of trading whenever any underlying constituents of the index are changed will cause underperformance relative to the index.
- May be difficult to fully replicate e.g. free float, strategic holdings *etc.*

Partial replication:

- A representative selection or stratified sample of 80 shares is held.
- This might involve a lesser number of shares carefully chosen, so as to broadly reflect the various characteristics of the shares in the index, e.g.:
 - the market weightings in each of the main sectors,
 - the sizes of the companies,
 - their exposures to overseas earnings, *etc.*

Advantages:

- + Lower management costs by avoiding a more fragmented portfolio.
- + Lower dealing costs as the fund is not committed to trade whenever an index constituent changes.

Disadvantages:

- Tracking error is likely to be greater than full replication.
- Research costs of deciding exactly which shares to hold may be higher.

Synthetic fund:

- Use an appropriate combination of cash and derivatives to broadly replicate the performance of the index.

Advantages / Disadvantages – similar to that of partial replication.

QUESTION 6

Examiners' comments:

This was reasonably answered.

Parts (i) and (ii) were generally done well.

Parts (iii) and (iv) were done poorly, despite this being a very simple bookwork formula. A surprising number of students wrote down the formula for equity returns, thus ignoring the impact of tax on Accrued Interest. Some ignored tax on the XD adjustment, or simply applied tax incorrectly. Many gave a formula for the index, not the return as required.

In Part (iv) many students wasted time by calculating quarterly returns and linking these (and invariably went wrong in the process). Many did not realise that the XD adjustment is reset to nil at the start of the year (and some thought the Accrued Interest is reset to nil).

Specimen Solution:

i.

Possible uses of corporate bond indices include:

- Measuring short-term corporate bond market movements – prices and / or yields.
- Providing a history of corporate bond market movements and yield levels.
- To give a description of the average level of current yields – including compensation for default risk and lower marketability.
- As a tool for estimating future movements in the corporate bond market, based on past trends.
- As a benchmark against which to assess the investment performance of portfolios.
- Valuation of a notional portfolio.
- Analysing sub-sectors of the corporate bond market.
- To provide the basis for the creation of derivative instruments relating to the corporate bond market or a sub-section of that market, and to provide the basis for establishing tracker funds;
- A standard against which yields on other fixed interest investments can be assessed.
- Approximate valuation of a fixed interest portfolio.
- Providing a picture of general yield structures of fixed interest investments.
- To measure the yield gap with government bonds and equities, and thus consider their relative attractiveness.
- To help set the terms for new issues of corporate bonds.
- To compare against historic returns on other asset classes.
- Active management: e.g. for anomaly switches based on price/yield comparisons with benchmark, and as a benchmark/reference point for allocation of risk budgets to corporate fund managers.

ii.

Issues to consider include:

- Bond characteristics vary by term and credit rating, need to split into sufficiently homogeneous groups while still retaining sufficient data per group.
- Whether price and/or yield indices should be produced.
- Weighting factors: none or market capitalisation.
- Price data to use: clean or dirty prices.
- Income issues: how to allow for income, timing of reinvestment, tax, expenses (use of a total return index).
- Frequency of calculation.
- Allowance needs to be made for new issues, maturities, defaults, movements between categories (chain linking).
- As this is a developing country, there may not be sufficient number of bonds, or they may not trade often enough for useful indices to be produced.
- Index credibility might be an issue if the process is not transparent, or the data quality and/or calculations not done correctly on a continuous basis.

iii.

The total return between time 1 and 2 is given by:

$$TR_{1,2} = \{I_2 - I_1 + (1-T)(XD_2 - XD_1) - T(ACC_2 - ACC_1)\} / I_1$$

Where:

- I_1 , XD_1 and ACC_1 are the index number, the ex-dividend adjustment to date and the accrued interest respectively at the beginning of the period.
- I_2 , XD_2 and ACC_2 are the respective figures at the end of the period.
- T is the rate of tax.

iv.

$$\begin{aligned} XD_2 - XD_1 &= 9.3 - 5.7 + 4.8 &= 8.4 \\ ACC_2 - ACC_1 &= 2.9 - 2.3 &= 0.6 \\ I_2 - I_1 &= 87.5 - 78.0 &= 9.5 \end{aligned}$$

$$\begin{aligned} \text{Hence, } TR_{1,2} &= \{9.5 + (1 - 0.35) \times 8.4 - 0.35 \times 0.6\} / 78.0 \\ &= 18.9\% \end{aligned}$$

QUESTION 7

Examiners' comments:

This was a reasonably straightforward performance measurement question, and was well-answered for the most part. Most students got most of the marks on offer for the calculation parts (i) and (iii), although some students confused the Sharpe and Treynor measures and many used variance instead of standard deviation in the denominator of the Sharpe ratio. The interpretation parts (ii) and (iv) were less well-handled. In particular for part (iv), many students simply trotted out the bookwork hedge fund problems of selection and survivorship bias, failing to recognise that these do not apply in the same way to evaluating the performance of a single fund of hedge funds.

Specimen Solution:

i.

$$MWRR = \frac{(MV_1 - MV_0 - NCF)}{(MV_0 + 0.5 NCF)}$$

$$MWRR_e = \frac{(730 - 650)}{650} = 12.31\%$$

$$MWRR_{hf} = \frac{(210 - 50 - 100)}{50 + 50} = 60\% \text{ (63.93\% using quadratic formula)}$$

$$LIRR = \frac{MV_{0.5}}{MV_0} \times \frac{MV_1}{MV_{0.5} + NCF} - 1$$

$$LIRR_e = \frac{730}{650} - 1 = 12.31\%$$

$$LIRR_{hf} = \frac{48}{50} \times \frac{210}{48 + 100} - 1 = 36.22\%$$

ii.

The two measures are identical for equities, since there was no net cash flow to equities over the period.

The MWRR is much higher for the fund of hedge funds than its LIRR, because its second-half performance was very strong and its first-half performance weak, and the second-half performance gets extra weighting because of the significant net cash flow.

The LIRR is a preferable measure for comparison between portfolios as it is not distorted by the timing and size of cash flows. However, given that we are dealing with managers with different mandates, risk-adjusted performance measures should be preferred to either as a basis for comparison.

iii.

$$Sharpe = \frac{(R_p - r)}{\sigma_p}$$

$$Treydor = \frac{(R_p - r)}{\beta_p}$$

$$S_e = \frac{0.1231 - 0.05}{\sqrt{0.04}} = 0.365$$

$$S_{hf} = \frac{0.3622 - 0.05}{\sqrt{0.0169}} = 2.401$$

$$T_e = \frac{0.1231 - 0.05}{1.0} = 0.073$$

$$T_{hf} = \frac{0.3622 - 0.05}{0.85} = 0.367$$

As the portfolios constitute part of the overall fund portfolio, rather than all of it, the Treynor measure is generally preferred for comparison.

iv.

The Treynor measure assumes that the CAPM holds, i.e. that β is a sufficient and appropriate measure of systematic risk.

Assumptions underlying the CAPM include that either investors have quadratic utility functions (which is at odds with empirical evidence) or that investment returns are distributed elliptically symmetrically (e.g. normally).

Returns of real asset classes tend to be non-normal, exhibiting skewness and leptokurtosis. This is particularly pronounced for hedge funds, given their use of leverage and derivatives.

The Treynor measure further makes no allowance for actuarial risk or downside risk.

Potential valuation issues for hedge funds (e.g. stale prices, model risk) can lead to an understatement of the variance of returns for the fund of hedge funds since volatility of individual funds and their correlations can be understated.

Hence efficiency of return generation as measured by the Treynor measure will be overstated.

Moreover, the evaluation is over a very short time period and takes no account of fund objectives or constraints.

QUESTION 8

Examiners' comments

This question was poorly-answered on the whole. It required an understanding of prospect theory and of equity-linked notes at a sufficiently deep level to be able to apply them to straightforward situations, and this understanding was noticeably lacking in most students. Some patently false statements were made about both prospect theory and expected utility theory by a number of students, and many failed to refer to features of the graph in their answers despite the explicit instruction in the question wording. Many students also wasted valuable time by giving long-winded, but unnecessary, examples to illustrate the valid points they made. Very few students mentioned loss aversion in their answers to (i), which made identifying the key attraction of ELNs to investors with prospect theory preferences in (iv) very difficult.

Solution

i.

Utility/value is assessed in terms of gains or losses relative to some reference point, usually the status quo, rather than in terms of terminal absolute wealth, hence the inflexion about the reference point in the graph.

In the territory of gains, people tend to be risk-averse, hence the concave shape to the right of the y-axis; however, we have a tendency to be risk-seeking when faced with prospects involving losses, hence the convex shape to the left.

People are loss-averse, that is, they feel losses more sharply than the equivalent gains, hence the curve is much steeper below the reference point than above.

ii.

An ELN is a structured product, which is a pre-packaged investment strategy in the form of a single investment.

It has a defined term promising a terminal benefit with a capital guarantee, and upside exposure linked to the performance of an equity index over the term. The guarantee is usually only applicable if held to maturity, so there is some liquidity risk.

Part of the investment is used to purchase a zero-coupon bond to fund the capital guarantee, and the balance is used to purchase a call option on an equity index with strike at the current level. (Alternatively, a combination of equity holdings and put options may be used.)

No income is typically payable during the term.

More complex varieties allow the amount invested in the zero-coupon bond to vary dynamically over time, and/or link capital protection to movements in the index.

iii.

At the outset:

- Purchase R6 800 worth of 5-year ZCB to fund capital guarantee.
- Balance of R3 200 will purchase approximately 90 call options with strike of 100.

After 5 years:

- Equity index = 85 => call options expire worthless and bond pays off R10 000 so capital is preserved, nil return.
- Equity index = 185 => call options pays off $90 * 85 = R7\ 650$ and bond pays off R10 000, giving a total of R17 650. Receive 90% of the equity market return, return = 12.03% p.a.

iv.

Loss aversion implies that investors will look to avoid losses, requiring significant upside to take the downside risk of incurring losses.

By providing a capital guarantee, there is assurance that the investor will not suffer a nominal loss over the term of the investment, although this relies to some extent on money illusion since a nominal capital guarantee implies real capital loss in the presence of inflation.

However, some exposure to the upside of equity movements is preserved, which is attractive.