

EXAMINERS' REPORT

June 2021 examinations

Subject F105 — *Finance and Investment* Fellowship Principles

INTRODUCTION

The attached report has been prepared by the subject's Principal 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

i.

Carbon credits:

- Are based on regulatory derived commodity (carbon)
- Thus not a tangible asset
- Purpose is to regulate greenhouse gas emissions
- Relatively small number of trading instruments available

Gold differs from carbon credits in the following aspects:

- Tangible asset
- Incurs storage costs if held
- Is a real asset i.e. value expected to keep pace with inflation

ii.

- Anchoring – you firmly believe in the company’s business model and management (perhaps this was a good company to have invested in a long time ago), and this may be causing you to ignore bad news affecting the company.
- Prospect theory – you become risk seeking when faced with losses as you may be trying to make up past underperformance
- Overconfidence - you believe that you have better skills and experience than others, and that you will be proved right in time.
- Confirmation bias - you are giving more attention to evidence that supports your view

iii.

The risk is that:

- A company’s financial performance deteriorates
- leading to mark-to-market losses [the company’s credit spread increasing (with or without a credit downgrade) , which then leads to a drop in the price of its corporate bonds]
- defaults on interest and/or capital payments after a hurricane
- risk of downgrade of bonds, leading to poorer quality portfolio
- Protection can be gained by purchasing credit default swaps
- which compensate the holder after a credit event (downgrade or a non-payment)
- working: pay a premium; at a credit event, the bond is exchanged for the nominal
- The CDS comes with credit risk

[Examiner comments: The question was generally well answered. In part (iii) the question asked for a derivative strategy but a number of candidates referred to catastrophe bonds which is an insurance strategy.]

QUESTION 2

i.

For a business, liquidity risk is the risk that cashflows from assets are insufficient to meet liabilities and operational needs in all future periods.

ii.

The company can do a 12-month “rolling” plan of its current assets and liabilities (collectively called working capital). Project debtors, creditors, raw stock, manufactured goods and cash balances forward in time, using assumptions based its long-term business plans (production and sales plans) and current market conditions. Allow for the settlement policies adopted in respect of accounts payable and receivable. Perform stress tests on the assumptions used. Allowance should also be made for tax, and any dividend and interest payments, liquidity gap analysis.

iii.

- Bridging Bank loan / bridging finance. Receive the required cash in three months’ time to cover the creditor’s payment. Repay the loan when MNF has managed to collect sufficient debt.
- Recourse factoring. MNF retains counterparty risk, but can borrow a portion of the face value of presented debtors’ invoices. MNF is still required to collect payments; this is a form of secured borrowing.
- *OR*
- Non-recourse Factoring.
- MNF sells on its trade debts to a factor in order to obtain cash payment of the accounts before their actual due date. The factor takes the credit risk and also responsibility for payment collection.

iv.

Bridging Bank loan / bridging finance. If the loan starts in three months’ time and lasts for two months, then MNF is exposed to interest rate risk (market risk).

Mitigation: enter into a forward rate agreement to fix the interest rate payable

Recourse factoring. Credit/Counterparty risk – the risk that debtors do not pay as expected.

Mitigation: Enter into non-recourse factoring instead, so doing transferring the credit risk.

Non-recourse factoring. Credit market risk: if the factoring transaction is only entered into in say three months’ time, then the discount rates available on the debt may be large on account of market conditions, so the proceeds of the sale may be less than expected.

Mitigation: offer discounts to debtors for early payment, prompting some to pay earlier.

v.

- Optimise the stock policy (an investigation will be required)
- Revisit the credit policy (shorten time to repayment; smaller credit allowances)
- In future, obtain bank acceptances for some or all invoices issued to debtor and selling them; (alternatively use factoring immediately as invoices are issued)
- Negotiate more flexible payment terms with suppliers /creditors
- Negotiate a line of credit with the bank

[Examiner comments: This question was generally not well answered. In part (ii) many students did not appreciate that a construction company is very unlikely to have investments in bonds and thus repos are not an appropriate transaction to improve its liquidity position. In part (iv) the question refers to “financial risks” but some students described other types of risks, which earned no marks. It is important to read the questions carefully.]

QUESTION 3

i.

1. Short-sell property: Borrow shares in the ETF and sell it immediately; buy back later in market when its price has (hopefully) dropped and return to lender.

- Max gain: Price obtained initially when the shares were sold.
- Max loss: If house prices (and therefore the ETF share value) continue to rise, possible losses are uncapped.

2. Buy a put option on the ETF price: Provides an investor with the option to sell the ETF at a predetermined (hopefully higher) price on maturity date than what it can be purchased for in the market at maturity.

- Max gain: The strike/exercise price (realised if stock prices plummet to zero).
- Max loss: The option premium paid.

3. Enter a short forward on the ETF (or a futures contract on the ETF or the underlying property index if the ETF tracks an index): Enter an agreement to sell shares in the ETF at a specified (hopefully higher) level than what the ETF can be purchased for in the market at the maturity date.

- Max gain: The forward price (realised if the ETF value (and therefore the underlying stock prices) plummets to zero).
- Max loss: If house prices (and therefore the level of the property ETF) continue to rise, possible losses are uncapped because the forward has to be exercised.

- ii.
 - Funding details, including,
 - ...cost of funding: Are the expected returns sufficient to cover the cost of funding as well.
 - ...term
 - ...amount available: Will impact the level of exposure the investor can gain and therefore level of overall returns expected.
 - ...repayment requirements: Will the financing have to be repaid before proceeds from the strategies are received?
 - Other market participants might also expect a drop in the housing market and derivative markets may already have factored in this view.
 - ...the cost of options might therefore be substantial.
 - ...The more financing is needed, the higher the financing costs to be covered.
 - A profit may not be realised (and even a loss made) if the investor's view turns out to be incorrect, yet the financing costs will still have to be paid.
 - Will the investor have access to further funding if required (e.g. for margin calls on a futures contract)
 - If the investor does not have the assets to fund this strategy, he needs to consider where he will get the funds to pay for any losses (including the financing cost and repayment of financing) if incurred.
 - Are there more profitably investment opportunities for which the funding can be used?

[Examiner comments:

- i. Many candidates stated what the expected payoff from their strategies are, whereas the question specifically asked for the maximum potential gain and loss.*
- ii. This question was poorly read. Most candidate failed to present considerations related to the use of the funding secured and only provided general considerations to take into account.]*

QUESTION 4

- i.
 - to correct market inefficiencies and to promote efficient and orderly markets
 - to protect consumers of financial products
 - to maintain confidence in the financial system
 - to help reduce financial crime

ii.

Advantages:

- it should be less open to abuse than the alternatives, and therefore may command a higher degree of public confidence.
- Economies of scale can be achieved, e.g. by using some of the regulatory resources used for the listed market

Disadvantages:

- can be more costly, less effective and slower to respond to changing market circumstances than alternative regimes where market participants have a larger influence

iii.

- The issuer must provide timeous information regarding its key personnel, business plans and the issue itself prior to on-line auction (*candidate must mention at least two data items for two ticks*)
- *Prevention of market failure*: reduces the asymmetry of information; potential investors can make an informed decision on purchase and pricing
- The on-line platform must verify the identity of key personnel and the veracity of the business premises provided.
- *Prevention of market failure*: reduce the probability of investors being scammed
- The auction process must occur according to well understood rules (be orderly) and be fair to all participants, auction process to be audited by an external third party, OR
- Conflicts of interest can be reported to the regulator or ombudsman, regulation might prevent employees of issuing companies to be involved with new issues
- *Prevention of market failure*: treating each customer fairly, with an equally opportunity to participate in the auction
- On-line platform to appoint registered lawyers to handle issuance of instruments within the appropriate legal framework
- *Prevention of market failure*: ensures that issuers are legally obligated to fulfil their duties under the instrument
- Verification of source of funds used to pay for instrument: buyers to register on platform, indicate source of funds, payment for instruments come from pre-approved banks only, suspicious transactions can be reported to the regulator or ombudsman
- *Prevention of market failure*: prevention of financial crimes such as money laundering and prevention of failed transactions
- schemes to compensate investors for breaches of the regulations, issuers to pay a % contribution to the fund.
- *Prevention of market failure*: this is a measure of additional safety for retail investors to protect against fraudulent issuers, maintaining confidence in this market
- Limits on companies offering instruments: by size to prevent big firms from dominating the market. Platform to verify basic levels of solvency of issuing firms.
- *Prevention of market failure*: only intended companies to enter the market

iv.

Unlike a with-coupon bond, the zero coupon allows the company time to invest before the need for cash repayments. This allows the company time and space to develop their product/service to a higher level of quality.

In exchange for the zero coupon (compared to credit bonds), the issuer gives the possibility of shareholding if the company does well, diluting the holding of current shareholders. In this case there is no need to repay the debt notional, so there is no need to refinance or liquidate assets.

v.

a. After conversion there will be 1.5m shares, of which the original bondholders will hold one third. Therefore, if $A/3 > R2m$, the bondholders will convert. So, $A > R6m$.

b. $R3m + 80\% * R2m = R4.6m$

c.

| Annual asset growth (A) | Final Asset Value (B) | Bond Pay-off (C) | Annualised Bond return (D) |
|-------------------------|-----------------------|--------------------------|----------------------------|
| | $B=4.6*(1+A)^5$ | $C=\max(B/3, \min(2,B))$ | $(C/4.6)^{0.2}-1$ |
| -20% | R1.5073m | R1.5073m | -1.19% |
| 0% | R4.6m | R2m | 4.56% |
| 30% | R17.0895m | R5.6932 | 28.90% |

[Examiner's comments: Part (i) was bookwork and very well answered. Part (ii) was also book and also well answered. Part (iii) generated reasonable answers. Some candidates wrote about the instruments as though they are or would be listed. Part (iv) was harder. Few candidates highlighted the lower liquidity requirement on the issuer of a zero-coupon bond and very few mentioned that conversion would lead to a dilution of shareholding. Part (v) most candidates could calculate part (b). Some did part (a) correctly and very few got part (c) correctly. At this level candidates seem to shy away from numerical questions.]

QUESTION 5

i.

FTSE/JSE Africa Headline Indices comprise:

- **FTSE/JSE ALSI (All share index)** consisting of 99% of all listed companies;
- **TOP40**: consists of the 40 largest stocks, constituting around 84% of the ALSI;
- **Mid-cap index**, made up of stocks from position 41 to 100, and around 14% of the ALSI;
- **Small cap index**, made up of stocks from position 101, and about 2% of the ALSI;
- **Fledgling Index** consisting of the 1% of listed companies not included in the ALSI.

ii.

Multifactor models:

- They attempt to model the historical investment returns as a function of several sources of systemic risk, which may be macroeconomic variables and/or company-specific factors.

- Observed historic returns on security i are modelled by: $R_i = a_i + b_{i,1}I_1 + b_{i,2}I_2 + \dots + b_{i,L}I_L + c_i$ where:
 - R_i = return on security i
 - a_i and c_i are the constant and random parts respectively of the component of return unique to security i
 - $I_1 \dots I_L$ are the changes in a set of L factors that explain the variation of R_i about the expected return a_i
 - $b_{i,k}$ = sensitivity of security i to factor k

Use by passive equity fund managers:

- Multifactor models can be used to identify and control the exposure of a portfolio to the different risk factors and to change the risk profile of the portfolio to better match the exposure of the index being tracked.
 - This is because they can be used to examine the relationships between both the assets and the index and the various economic influences and other risk factors.
 - By quantifying the impact of various risk factors upon both assets and the index, such models enable the fund manager to select the assets so that their exposure to each risk factor is similar to that of the index being tracked.
 - Consequently the assets and index should be broadly matched, thereby reducing the manager's exposure to tracking error.
- Multifactor models can then be used in conjunction with stratified sampling (choosing a sample of shares that broadly reflect the various characteristics of the shares in the index)
- Multifactor models can also be used in conjunction with the synthetic fund approach (choosing a combination of cash and derivatives to broadly replicate the performance of the index being tracked).
- In practice it may be difficult to identify the factors affecting the expected return on a particular security, and estimating the relationships between those factors and expected returns.
 - The model is fitted using past data and continued validity of parameters should be tested regularly.

iii.

- Fund return = $755/730 - 1 = 3.42\%$ p.a.
- Index return = $15\% (3750/3500 - 1) + 35\% (1100/1200 - 1) + 50\% (1050/950 - 1) = 3.42\%$ p.a.
- Assume that there is no rebalancing during the year

iv.

- Outperformance = 0% p.a.
- Notional Fund return (notional weights, actual returns)
 - = $15\% (200/180 - 1) + 35\% (230/250 - 1) + 50\% (325/300 - 1) = 3\%$ p.a. .
- Industry selection = Fund return - Notional Fund return (notional weights, actual returns)
 - = 3.4% p.a. - 3% p.a. = 0.4% p.a.
- Stock selection = Outperformance - Industry selection
 - = 0% p.a. - 0.4% p.a. = -0.4% p.a.

Alternatively:

- Outperformance = 0% p.a.
- Notional Fund return (actual weights, notional returns)
 - $= (180/730) \times (3750/3500 - 1) + (250/730) \times (1100/1200 - 1) + (300/730) \times (1050/950 - 1) = 3.2\%$ p.a.
- Industry selection = Notional Fund return (actual weights, notional returns) - Index return
 - = 3.2% p.a. - 3.4% p.a. = -0.2% p.a.
- Stock selection = Outperformance – Industry selection
 - = 0% p.a. - -0.2% p.a. = 0.2% p.a.

v.

Comments:

- Net outperformance is nil, so the manager tracked the index very closely, as should be expected of a passive fund manager
 - Net of fees passive fund managers usually underperform, so it should be checked that fund values provided are after deduction of fees or before.
 - The impact of tax should also be investigated (on fund and index data) to verify comparability.
- The attribution shows relatively small stock and industry selection profits/losses, which is consistent with what one would expect from a passive fund manager.
- Weights and performances by industry:

| | Resources index | Financials index | Industrials index |
|----------------------------|-----------------|------------------|-------------------|
| 31.12.2019 Weights (index) | 15% | 35% | 50% |
| 31.12.2019 Weights (fund) | 24.7% | 34.2% | 41.1% |
| | | | |
| 2020 returns (index) | 7.1% | -8.3% | 10.5% |
| 2020 returns (fund) | 11.1% | -8.0% | 8.3% |

- The above table shows that the fund was overweight Resources (where it outperformed) and underweight Industrials (where it underperformed).
- This might suggest that either:
 - The fund manager's multifactor model is not working well (due to deviations by industry) and it was lucky that overall performance was close to the index, or
 - The fund manager's multifactor model is working well (the objective was not to track each sub-index but the overall index).
- Performance is only given for one year and ideally should be for several years (over several market cycles) to provide a more useful analysis.
 - One year makes it difficult to assess the risks taken by the fund manager (relative to the index), and in addition to a longer performance record, risk-adjusted measures (e.g. tracking error) could also be used to gain insight into the success of the manager's methods.

[Examiner comments:

Overall this question was done reasonably well, although there was a wide spread between the weakest and strongest candidates.

Part (i) was bookwork and generally done well. The question asked for equity indices and several candidates listed bond indices.

Part (ii) was generally well answered, although the weakest candidates could not explain clearly how multifactor models are used by passive managers.

Parts (iii) and (iv) were generally well answered, although several students made careless arithmetic errors.

Part (v) was the least well-done part, even by students that performed well in earlier parts. Most students approached this answer as if the manager was an active one, talking about stock-picking skills vs sector selection skills, and giving possible economic reasons for the manager choosing to be over- or under-weight certain sectors.]

QUESTION 6

i.

Absolute pricing

- Price assets with reference to fundamental sources of macroeconomic risk such as inflation, economic growth and interest rates.
- E.g. consumption-based models, general equilibrium models (e.g. CAPM).

Relative pricing

- Price of asset is determined relative to the price of some other assets.
- Information on the fundamental risk factors is therefore not used, nor do we consider what the source of the prices of the others assets are.
- E.g. Black-Scholes or Arbitrage Pricing Theory.

ii.

- The value of alternative investment projects will not be directly observable in the market.
- Need to value the project at funding stage to determine whether new projects are favourable projects or not.
- Need to value the existing portfolio to determine the amount due to an investor who wants to withdraw from the portfolio
- ...or for reporting purposes.

iii.

- The price/value of the toll road project equals the expected value of discounted future payoffs.
- p_t is the value of the asset at time t

- m_n is a stochastic discount factor (or pricing kernel/state price deflator)
- x_n is the expected payoff of the asset at time n
- E_t is the expectations operator based on the information available at time t

iv.

- Number of road users
- Distances travelled by users
- Toll fees to be charged per type of user
- Toll fee collection method (e.g. prepaid, cash, 30-day accounts)
- Inflation to be applied to future toll fees
- Economic growth forecasts
- Implementation costs
- Ongoing maintenance costs

v.

- A revised downward projection of proceeds implies a devaluation of the project value.
- This translates into an immediate loss to investors.
- Loss/lower returns will be locked in unless a resolution to the problem is found.
 - *Remedy:* Assist toll provider with finding a way in which to improve collections.
 - *Remedy:* Sell the project to not face further losses from other unforeseen events.
- Relative performance risk: Portfolio's performance relative to other similar funds might be poor.
 - *Remedy:* Increase hurdle rate for future projects to try and enhance the overall returns of the portfolio.
- Poor relative performance might lead to investors withdrawing from the portfolio.
- This would create the risk that projects cannot be liquidated quickly enough or without sustaining further losses.
 - *Remedy:* Increase the notice period from 6 to 12 months.
- Fund liquidity is reduced via reduced inflows and lower profits from this project.
 - *Remedy:* Assist toll provider in finding ways in which to reduce maintenance, operational and other expenses to make up for the lost income.

[Examiner comments:

- This was a bookwork question and was well answered.*
- Many students spoke of valuing the project with the view of comparing its price with the market price of other projects. But what would the market price constitute given that the value of infrastructure projects is not readily available in the market?*
- This part was answered fairly well by most candidates.*
- Most candidates were able to identify some data series, although very few mentioned enough to score high marks.*
- Candidates did not think widely enough to produce more than one or two impacts on the portfolio. Only a few mentioned the relative performance risk (although none use that term).]*

QUESTION 7

i.

(a)

- Anomaly switches,
- as these are less likely to alter the duration match of the liabilities.

(b)

- Policy switches,
- as these allow the investor the freedom to attempt to maximise return based on the investor's view of future changes in the level and shape of the yield curve

ii.

- The 20-year bond offers a higher yield and at face value appears to be more attractive.
- The investor might consider the calculated reinvestment rate to be historically low,
- and therefore easily attainable, when reinvesting later. (the investor may believe that reinvesting at a rate better than the calculated reinvestment rate has a high probability)
- If he is correct, investing in the 10-year bond and reinvesting the proceeds will give a better outcome than investing in the 20-year bond.

iii.

- First an estimate of the risk premium for the AA rated bond will be needed, with a view to how this might change over the length of the anomaly switch.
- This view will take into account default risk and other factors affecting the yield such as lack of liquidity, coupon and any tax differences.
- This will be used to estimate the additional yield that could be obtained through changes in the risk premium relative to benchmark government bond yields.
- An allowance should be made for transaction costs at both ends of the switch.
- Based on the additional yield, a decision as to whether to proceed with the switch can be made.

[Examiner's comments: This question was answered reasonably well.]

QUESTION 8

i.

ALM

- An ALM is a model used to project the asset proceeds and liability outgo into the future at the same time

VaR

- The Value at Risk (VaR) is an estimate of the maximum loss that could be suffered by an investor with a specified probability level over a specified period of time.

OR

- Value at Risk (VaR) generalises the likelihood of under-performing by providing a statistical measure of downside risk. VaR assesses the:
 - potential losses on a portfolio
 - over a given future time period
 - with a given degree of confidence.

ii.

- They would use an ALM as a method of taking into account the variation in the assets simultaneously with the variation in the liabilities in order to control the risk of failing to meet the objectives.
- An initial asset class allocation is selected and the outcome (expressed in terms of the objectives) of this investment strategy is examined with the model and compared with the investment objectives.
- In this case the range of possible “replacement ratios” for a given asset allocation would be assessed against the 75% objective.
- The asset allocation is then adjusted in the light of the results obtained and the process repeated until the optimal strategy (that which is most likely to meet the objectives) is reached.
- The trustees would want an asset allocation where at least 90% of the possible replacement ratios are greater than 75%.
- The result of the ALM results in a proposed asset allocation comprising specific (fixed) percentages allocated to each asset class by way of investing passively in the underlying asset class benchmarks used in the modelling.

iii.

The trustees may decide to deviate....in order to:

- Pursue higher returns
- Align with regulation
- Achieve ESG objectives

iv.

- Total risk budget depends on the risk appetite of the trustees and members,
- Trustees need to allocate the total risk budget between strategic risk and total active risk.
 - Strategic risk refers to the risk taken on by selecting a strategic asset allocation (SAA) which deviates away from the AA proposed by the ALM
 - Active risk refers to tactical decision to deviate from SAA and/or from benchmarks awarded to managers.
 - The trustees must decide how much (if any) risk they wish to allocate to these classes of risk
- The fund would want to estimate the lowest possible replacement ratio that a member may expect to achieve at retirement should a particular strategy be selected.
- The VaR would be used in order to help the trustees decide how much additional risk they would be comfortable with and where to allocate that risk

v.

Depending on their risk appetite the trustees may:

- Have a zero risk budget and allocate the assets exactly according to the AA as proposed by the ALM.
 - For each asset class they would adopt a passive investment approach
 - They must take care to follow the investment index used in the ALM modelling in each case else they will be taking unintended active risk.
- They could allocate some of their risk budget to **strategic risk** and decide to follow a different strategic asset allocation (SAA) should they believe that there is potential for reward by adopting the revised asset allocation
 - For example: increase exposure to offshore equities in the belief that local conditions are not conducive to economic growth when compared to overseas (or VV)
 - For example : increase allocation to local cash as they believe many of their members are highly risk averse
- They could implement **active risk** both at the asset allocation level (tactical asset allocation) and/or the asset class level.
 - For example manage asset class allocation actively using TAA but with passive allocation within each asset class
 - Or keep the asset allocation strictly in line with the SAA but adopt an actively managed approach within each asset class
 - Or adopt active investing for both the asset class allocation and the underlying asset classes (this would probably be the same manager)
- Should they implement active risk at the asset allocation level they could appoint a multi-asset class manager to tactically deviate the allocation to asset class exposures away from the SAA in order to enhance returns.
 - They would need to decide on the level of risk to allow this manger to take and set acceptable ranges for each asset class which the manager could not move outside of.
 - The VaR modelling would help set these ranges
 - The underlying asset classes could then be managed passively or actively

- Should they also wish to adopt an active approach within asset classes the same manager would likely be appointed to manage asset allocation and stock selection within asset classes.
- (Although they could appoint separate active managers for each asset class as well as a separate TAA manager)
- Should they elect to apply none of the risk budget to the strategic risk (in other words stick to the optimal ALM asset allocation) and direct the full risk budget to active risk, they would allocate these fixed amounts to each asset class and then award active mandates to underlying managers for each asset class.
 - Where active managers are appointed to implement stock selection within asset classes they would need to provide each manager with
 - a benchmark (again must be what was used in the ALM)
 - a measure of the degree of risk each manager could take on
 - This would be implemented by setting tracking error limits for equity managers
 - And possible limits around portfolio deviations from the benchmark duration in the case of fixed income portfolios
 - As well as limits on the degree of credit risk which can be implemented.
 - A rebalancing policy would need to be established depending on the final investment strategy adopted.

[Examiner comments

Parts I and iii well answered for the most part.

Parts ii, iv and v. Most Alarming was how many candidates referred to surplus or funding level in a DC environment! Biggest issue was that candidates Failed to read and use the details provided in the question. E.g. broadly referring to probability of meeting objective without stating what the objective was given as in the question. For part ii they did not read question carefully and simply gave the generic, general steps of performing an ALM . For part iv many neglected to discuss the components of total risk separately. Part v was answered very poorly. Most candidates did not write enough points considering the number of marks for the question. Again did not read what the question asked and simply discussed a broad range of generic investment strategies (e.g. active vs passive and balanced vs specialist or value vs growth) or general considerations when devising a strategy, not focusing on which decision are informed by the risk budgeting exercise specifically. Question stated ”..in implementing the risk budget” and “...resulting from the risk budgeting exercise”. The considerations given were very generic - regulation, costs, tax etc rather than related to the risk budgeting exercise.]

END OF EXAMINERS’ REPORT