

Institute of Actuaries of India

Subject ST5 – Finance and Investment A

September 2017 Examination

INDICATIVE SOLUTION

Solution 1:**a) Unit Trust:**

An open-ended investment vehicle whereby investors can buy “units” in an underlying pool of assets from the trust manager. If there is demand for units, the managers can create more units for sale to investors. If there are redemptions (sales by investors), the managers will buy in units offered to them. Unit trusts are trusts in the legal sense.

b) Quantitative Easing:

Quantitative Easing (QE) is a monetary policy used by some central banks to increase the supply of money to reduce the interest rates. Quantitative easing increases the [money supply](#) by financing financial institutions with capital in an effort to promote increased lending and [liquidity](#). Quantitative easing does not involve the printing of new [bank notes](#). It usually involves both a direct increase in the money supply (i.e. electronically “printing” money) and a knock-on effect from the fractional reserve system, increasing the money supply further, although it can involve just making changes to the fractional reserve system.

c) Structured Product:

A structured product is a pre-packaged investment strategy in the form of a single investment. A typical structured product will consist of two components:

1. A Note – essentially a zero-coupon debt security that provides capital protection, i.e. guarantees a return of all or part of the initial investment at maturity. This is sometimes referred to as the “principal guarantee” function. The guarantee may only be in place if the structured product is held until maturity.
2. A derivative component that provides exposure to one or several underlying assets such as equities, commodities, FX or interest rates. Returns from the derivative can be paid out in the form of coupons during the lifetime of the product, or added to proceeds at maturity.

d) Straddle:

A straddle is an options strategy in which the investor holds a position in both a call and put with the same [strike price](#) and [expiration date](#), paying both [premiums](#). This strategy allows the investor to make a profit regardless of whether the price of the security goes up or down, assuming the stock price changes somewhat significantly

A unique feature of options is that the price of an option depends on the volatility of the price of the underlying security. Thus an investor who believes that they have information which will affect the volatility in a way not yet anticipated by the market can seek to gain from this information by entering into straddle positions in options.

A straddle might be sensible if you are sure that the underlying share price will be volatile, but if you are not sure which way the price will move.

e) Private Debt:

Private debt (or “private placement”) is a debt capital market transaction that generally has covenant features similar to a bank loan and is often used as an alternative to bank funding. It will be marketed to a much smaller number of long-term “buy and hold” investors, with the deal eventually being distributed to between few interested parties.

[10 marks]

Solution 2:

i)

The distinctive features of ABC Ltd are:

- Airline manufacturing company is dependent on the level of investment spending. The companies are dependent on the strength of the economy and in particular the level of economic investment, i.e. “capital formation”.
- cyclical – the performance of general industrials is very dependent on the state of the economy and the trade cycle. The impact of the trade cycle can be heightened by the accelerator principle.
- Company profits tend to move ahead of the trade cycle – because capital expenditure throughout the economy is usually greatest at the start of a period of rapid economic growth. Share prices also move early in anticipation of a recovery.
- dependent on government spending – a fairly large proportion of capital expenditure is under the control of the government (e.g. new order for aircrafts), which means that general industrials may be exposed to the whims of government expenditure.
- volatile profits – because of the volatile demand for capital goods (due to the accelerator principle), profits can be very volatile. Also, in some cases the unit size of production is large. In these cases, winning or losing a new contract can have a big impact on profits.
- high profit margins when conditions are good – but when the economy moves towards recession, general industrials need to be able to cut their costs quickly to minimise their losses.
- low gearing because of volatile profits – recall that the stability of profits is an important consideration when determining whether to invest in a particular corporate bond.
- possibly exposed to overseas markets and competition – (e.g. engineering), in other cases domestic demand is more important (e.g. building materials).

(8)

ii)

- fundamental risks of the company's industry – which will reflect the type of industry in which the company operates; for example, cyclical or defensive, global or predominantly domestic
- competitive position (relative to peers)
- downside risk vs. upside potential
- quality of profitability vs. EPS growth – i.e. we need to consider the security/stability of profits as well as the projected growth rate
- cashflow generation vs. book profitability – i.e. whether the company is actually getting the cash in
- forward looking analysis – i.e. projecting the possible future experience of the company
- strategy, management track record and risk appetite – i.e. business plans and the character and ability of management
- Capital structure and financial flexibility.
- History of default on interest or principle repayment on debt instruments if any
- History of dividend payments
- History of paying statutory dues and delay if any
- History of employees payments and dues in Balance sheet

(4)

iii)

The financial strength of the Company can be assessed by analyzing the below ratios:

1. **Operating leverage** can be measured as:

$(\text{sales less variable costs}) / \text{profit before interest \& tax}$

It gives an indicator of a company's level of fixed operating costs.

2. **Financial leverage** is often used to refer to income gearing, which can be measured as:

$\text{interest payments} / \text{profit before interest \& tax}$

It gives an indication of the level of fixed financing costs.

3. **Asset or capital leverage** is typically measured as either:

$\text{Debt} / (\text{debt} + \text{equity})$ or $\text{debt} / \text{equity}$

based on balance sheet values.

4. **Capital structure** just refers to the financial structure of the company, i.e. the balance between debt and equity (and also anything else e.g. preference shares, short-term borrowings etc.)

5. **Order Pipeline** – Given the high capital intensive and long gestation period of aircrafts, a company with a reasonably good order pipeline could easily boast of a sound financial strength and plan research & development investments accordingly.

(5)

iv)

A structured financial product that pools together cash flow-generating assets and repackages this asset pool into discrete [tranches](#) that can be sold to investors. Collateralized debt obligations (CDO) are debt instruments, which can be bank loans, fixed income securities such as bonds, or other forms of debt. One typically takes an asset and slices it into an investment that offers various levels of risk and reward. As borrowers make payment, money flows into the CDO structure.

The tranches in a CDO vary substantially in their [risk profile](#). The senior tranches are relatively safer because they have first priority on the collateral in the [event of default](#). As a result, the senior tranches of a CDO generally have a higher [credit rating](#) and offer lower [coupon](#) rates than the junior tranches.

- Senior Debt: takes priority over all other tranches. This investment might be marketed at AAA quality, and holders of the tranche would be paid before all other investors.
- Mezzanine Debt: next in line for payment. It's subordinate only to the senior debt and might be marketed as AA quality. Holders of this tranche will be paid before holders of junior debt.
- Junior Debt: paid after both the senior and mezzanine debt and might be marketed as BBB quality. Holders of this tranche bear the greatest risk of non-payment, but they also receive the highest interest rate on the debt held.
- Equity: there can also be an equity tranche in the CDO, and dividends can be paid to holders of the equity tranche once all of the debt holders have been paid.

(6)

v)

As is the case with most investments, there is always a balance of risk and rewards. The advantages and disadvantages of these investments are summarized below.

Pros

- Poor quality debt may be bundled with investment quality debt, resulting in an improvement in the credit rating.
- Expected overall returns on CDOs are often 2% to 3% higher than corporate bonds carrying the same rating.
- The investor has the flexibility to choose from several combinations of risk and reward.

Cons

- Investors in lower tiered tranches are only paid if there is sufficient money to pay investors in higher tiered tranches.
- If default results within the collateral portfolio, there is a risk of non-payment of interest owed as well as the remaining principal.
- Market fears can result in a near standstill in trading, thereby creating a liquidity problem for the investor.

One example of this is the systemic buildup and the subsequent meltdown leading to the crisis of sub-prime mortgages in 2008.

(4)

vi)

A collateral is a form of secondary protection sometimes required by the bank or the lender and is intended to guarantee a borrower's performance on the underlying debt obligation.

In case the underlying cash flow generation were to falter, the value of the collateral would act as a plausible second source of repayment for the lenders.

The credit quality of the collateral should be investigated with the same level of rigour, like one would perform for the likelihood primary source of repayment of debt. The lender should be performing a Loss Given Default (LGD) based analysis for gauging the repayment capability.

The likelihood of default and the percentage recoverability of cashflows from the second source would need to be considered. Higher the percentage covered, greater would be the confidence on debt being serviced and lesser the credit default spread.

(4)

[31 marks]

Solution 3:**i)**

Going public is a very onerous task for the management. An IPO allows for a round of financing that should foster investment in growth and profitability.

The primary thing is to evaluate whether an IPO is feasible? The following four factors are critical to make an IPO feasible.

- How big is the market? How fast can the company grow? The bigger the market, the more money could be made leading to a potential faster growth.
- How disruptive is the product? Is the product a new way of doing something? The more disruptive the product the better.
- How predictable is the business model? If one can accurately predict how one will do in the future, whether quarterly or yearly, it has a huge advantage. The investment market likes quality and predictable earnings and hence this becomes important.
- The extent of competitive advantage - asset that the company controls that lets it gain more leverage over rivals.

The above criteria are necessary, but after that, the company needs to perform against specific milestones. Inconsistency and failure to meet performance objectives could impact the IPO adversely. Once an IPO is deemed feasible, a company must consistently hit these milestones.

- It has to have a meaningful Revenue stream and the level of revenue must be substantial.
- Does it have acceptable margins and headed in the right direction. Future profit and the potential for growth in profit gives the stock its value.
- Is a company likely to grown at a steady rate? A company that isn't growing or growing inconsistently is not ready for an IPO.
- Predictability is important both operationally and for future investors. The shareholders want to know what to expect from the company.

These eight points are critical so is the difference between feasibility and milestones.

(8)**ii)**

Listings authority is responsible for ensuring that any new issue of shares is conducted in an orderly and fair way.

This would include an initial offering of shares in a company that was previously privately held.

Listings authorities are also concerned with:

- ✓ the production of relevant business and financial information on the issue of shares, such as:
 - details of the number of shares on offer and the offer price
 - details of the number of shares (if any) currently in circulation
 - the underwriters of the issue (if there are any)
 - details of how shares will be allocated if the offer is over-subscribed
 - how the money raised will be used
 - the company's intended dividend policy
 - audited financial statements
 - an outline of the aims and objectives of the company and any special factors
 - details of the senior management and board directors and their salaries.
- ✓ the continuing production and dissemination of business and financial information on a timely basis on companies with listed securities.
- ✓ the process by which shares are offered to potential shareholders and the price is set for the issue of shares.
- ✓ the continuing conduct of the market in listed securities with a view to ensuring that the market is fair to all participants,
- ✓ the pricing process is fair and reasonable.
- ✓ Rules to ensure that companies with listed securities and connected parties continue to behave in a manner that does not conflict with other objectives of the listing authority.

(6)

iii)

The following could be possible benefits when entering into a merger like this.

Benefit from economies of scale – Both Companies can share core services common to both organizations, integration of major processes, IT platforms and management reporting.

Exploit complementary resources – Companies can now manage the travel cost and experience of the customers more effectively. If the privately-owned travel company has expertise in managing travel in Country A and another Company is better expertise in Country B, it could be easier and more effective via merger.

Further, the privately-owned company can expand itself easily in offline travel via merger.

Access opportunities only available to larger organizations – Being a larger company, it can negotiate the prices and benefits more effectively with its suppliers.

For example – it can bargain more aggressively for the per day cost of stay from Hotels.

Or even start group tours to overseas Countries if it has not been able to do so due to its small size.

Eliminate inefficiencies including underperforming management.

The aspects for a successful merger are:

- Strong and clear communication within both the organisations
- Talent retention
- Cultural alignment
- Operational integrations

(6)
[20 marks]

Solution 4:

i)

$$I(0) = 100 = (1 \times 100 + 1.25 \times 160 + 0.90 \times 60) / B(0)$$

$$\text{Or, } B(0) = 354/100 = 3.54$$

$$I(1) = (1.15 \times 100 + 1.1 \times 160 + 0.95 \times 60) / B(0) = 348/3.54 = 98.31$$

(2)

ii)

The position would be:

Stock	March 31, 2017	
	Share Price	Number of Shares
X	1.15	110
Y	1.10	160
Z	0.95	60

We know that the index was 98.31

$$I(1) = 98.31 = (1.15 \times 110 + 1.1 \times 160 + 0.95 \times 60) / B(1)$$

$$\text{Or, } B(1) = 359.5/98.31 = 3.66$$

As on May, 31 2007

$$I(2) = (1.50 \times 110 + 1.30 \times 160 + 1.15 \times 60) / B(1) = 120.77$$

(4)
[6 marks]

Solution 5:**i)**

For all companies liquidity risk is the risk that cashflows from assets are insufficient to meet liabilities in all future periods. The focus is on cash, which is a different test from the company having assets more than its liabilities.

For financial services institutions liquidity risk is the risk of not being able to raise funds (by borrowing or sale of assets) at a reasonable cost at all times and, therefore, the risk that a market does not have the capacity to handle the volume of desired transactions when needed.

Commercial banks take deposit from customers and hence have payment obligations.

Some of the deposits, like savings account can be withdrawn at any time and these don't have any penalty charge.

While some deposits like Fixed and Recurring deposits have a fixed time of maturity. However, these can be liquidated early after paying penalty charge.

The presence of penalty charges reduces the liquidity risk to some extent.

The assets of banks are cash, government securities and interest-earning loans, letters of credit, inter-bank loans, etc.

Some of these assets are liquid while others such as interest earning loans are not.

The day to day level of withdrawals can be made by liquid assets.

In a worst-case scenario, when all customers may try to withdraw all their funds, the bank would be unable to generate adequate cash without incurring substantial financial losses.

In severe cases, this may result in a bank run.

However, Banks generally have Repo desks ready to meet this risk as they can sell bonds in large quantities, with a contract to repurchase, without affecting the market price significantly, thus raising emergency cash.

Further, most banks are subject to regulatory requirements intended to help banks avoid such liquidity crisis.

(6)

ii)

Gap analysis can be used to measure the liquidity risk.

This method is useful for establishing liquidity policies and operating limits.

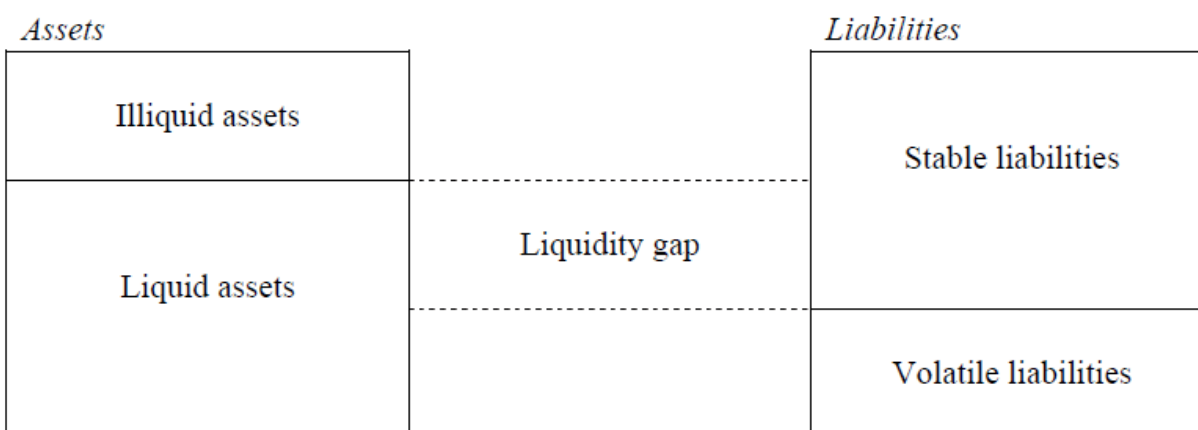
Under this method, all assets are allocated to one of two categories - liquid or illiquid.

All liabilities are classified as either stable or volatile.

A six-month remaining maturity criterion is usually adopted in classifying assets and liabilities.

So, assets maturing in six months or less would be classified as liquid, and liabilities that are due in six months or less would be classified as volatile.

Liquidity gap is defined as the difference between the level of liquid assets and volatile liabilities.



In analysing the net liquid assets position, allowance should be made for the liquidation costs associated with converting items to cash.

These costs will be a function of brokerage and investment banking fees and the basic bid-offer spread in the market for the assets involved, as well as the time available for conversion.

The liquidity gap approach does not quantify the potential cost or impact of such a gap under stressing situations such as an increase in the cost of finance.

Duration analysis is a more rigorous approach, where the impact of changes in market conditions is considered.

Extending the liquidity gap approach, it looks to quantify the potential cost of such a gap by considering the impact of a change in interest rates (specifically, an increase in the cost of raising funds).

The process consists of two steps:

1. Calculate the present value of assets and liabilities using the “cost of funds” rate as the discount rate

The basic gap (or institution's equity) is calculated as the present value of assets minus the present value of liabilities. The effect of an increase in interest rates at all durations is then measured. This rate of change is called the LRE.

2. Measure the change in the market value of the institution's equity (LRE) from a change in the cost of funds (due to an increase in the risk premium paid to raise money).

If the LRE is zero, the institution has zero liquidity risk (by this measure).

If the duration of the assets is longer than that of the liabilities, the LRE will be negative. This is because the value of assets will decrease more than the value of the liabilities following such an increase in interest rate.

So, if the LRE is negative then increases in interest rates will pose liquidity problems under stress situations where the cost of finance is high.

If the LRE is sharply negative, it will pay the institution to shorten the maturity of its assets and lengthen the maturity of its liabilities, thereby increasing liquidity.

Problems with the use of liquidity risk elasticity are that it assumes parallel changes in funding spread across all maturities and that it is only accurate for small changes in funding spreads.

(9)

[15 marks]

Solution 6:

i)

In managing an investment fund established to cover liabilities, managers will typically face two conflicting objectives:

1. to ensure solvency of the company and stability of costs
2. to achieve high long-term investment returns (in order to reduce cost).

To ensure solvency, one needs to match the assets to liabilities as closely as possible.

Whereas, to generate higher return, investment in assets which are expected to generate higher returns may be warranted but this would mean move away from a matched position.

(2)

ii)

The investment policy would need to reflect the extent to which the risks of lower solvency are to be taken on in order to aim for higher returns.

This will typically involve a two-stage process:

1. Establishing an appropriate asset mix for the fund – the strategic benchmark.

For example, suppose that life insurance company's liabilities are thought to be best matched with an asset mix of 30% equities and 70% bonds.

The investment manager is of the view that equities would offer higher long-term returns. Then she can set the strategic benchmark equal to 40% equities and 60% bonds.

That is, she hopes to increase the expected return on the portfolio by deliberately investing a mismatched position.

Due to this unmatched position, the assets might perform poorly than the liabilities. This risk is called as strategic (or policy) risk.

The extent to which risk can be taken in this way will be determined by the risk appetite of the fund.

For an insurance company this will be influenced by the level of free reserves.

As the company is new, it might have lower amount of free reserves and hence much deviation from the matched position may not be possible.

In practice, strategic risk may reflect both the risk of the matched benchmark relative to the liabilities and the risk taken by the strategic benchmark relative to the matched benchmark.

2. The tactical implementation of this strategy by the selection of one or more managers and a decision on the appropriate level of risk that these managers should take relative to the strategic benchmark.

This is known as the active (or manager or implementation) risk.

Each individual fund manager will be given a strategic benchmark by the CIO.

The zero-active risk approach would be simply to track the index.

However, the fund could allow an amount of active risk to be taken by the fund manager to generate higher return.

There may also be some structural risk associated with any mismatch between the aggregate of the portfolio benchmarks and the total fund benchmark.

The overall risk is the “sum” of the active, strategic and structural risks.

(6)

iii)

Investment in derivatives can help the investment manager to match the position easily without even purchasing the whole underlying assets. This would help in increasing efficiency and reducing transaction costs.

However, the derivative investment brings its own risk.

To reduce the risk associated with derivatives, appropriate reporting of exposure is important. This should include:

- listing derivatives individually in an intelligible way within portfolio valuations
- The valuation in any portfolio valuation should be the market value, not the nominal value or the book value which have little or no meaning for derivatives.
- including any additional explanations needed to ensure that the fund’s exposure is properly understood.

The report should also show the effective exposure to equities, which in the case of equity call options would be calculated as the (total option exposure multiplied with the delta of the options).

It may also be wise to show the other Greeks, such as the gamma exposure (the rate of change of the delta exposure with changes in the underlying).

All of the above would need to be clearly reported to allow proper derivative management to take place, and each derivative contract should be separately reported.

The report should make clear where the exposure of the portfolio to different asset classes has been changed using futures or swaps and what the associated economic exposure is.

When reporting on options, a written explanation of the strategy employed should be given and, where the use of options is material, a subsidiary option sensitivity analysis should be included.

(4)

[12 marks]

Solution 7:**a)**

Framing - The second campaign has been framed in terms of losses and is far effective than the first campaign which is framed in terms of gain.

b)

Overconfidence – Students realize that only 50% would be able to complete the activity. But when the question was asked specifically about their ability the overestimated.

c)

Anchoring – When the question “how often do you go on holiday” was asked first, it created an estimate in their mind. Accordingly, the answer to second question was better co-related with the first answer than the other scenario in which holiday question was asked second.

[6 marks]