

## MTP 1

### Market Price, Duration, Volatility, YTM with new Market Price

**1.(B) An investor has recently purchased substantial number of 7 year 6.75% ₹ 1,000 bond with 5% premium payable on maturity at a required Yield to Maturity (YTM) of 9%. However, due to a financial crunch he is looking to sell these bonds and has got a proposal from another investor, who is willing to purchase these bonds by selling out a maximum amount of ₹ 897 per bond. Investors follow intrinsic value method for valuation of bonds.**

**(i) You are required to determine**

**(1) The Market Price, Duration and Volatility of the bond and**

**(2) Required YTM of the new investor**

**(ii) What is relationship between the price of the bond and YTM?**

<b>Period (t)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>PVIF (9%, t)</b>	<b>0.917</b>	<b>0.842</b>	<b>0.772</b>	<b>0.708</b>	<b>0.650</b>	<b>0.596</b>	<b>0.547</b>

**ANSWER: 1(B)**

(i) (1) (A) Market Price of Bond

$$\begin{aligned}
 &= 1,000 \times 6.75\% \times (\text{PVIAF } 9\%,7) + 1,050 \times (\text{PVIF } 9\%,7) \\
 &= 67.50 \times 5.032 + 1050 \times 0.547 \\
 &= 339.66 + 574.35 \\
 &= ₹ 914.01
 \end{aligned}$$

(B) Duration of Bond

Year	Cash flow	P.V. @ 9%	PV	Proportion of bond value	Proportion of bond value × time (years)
1	67.50	0.917	61.898	0.0677	0.0677
2	67.50	0.842	56.835	0.0622	0.1244
3	67.50	0.772	52.110	0.0570	0.1710
4	67.50	0.708	47.790	0.0523	0.2092
5	67.50	0.650	43.875	0.0480	0.2400
6	67.50	0.596	40.230	0.0440	0.2640
7	1117.50	0.547	611.273	0.6688	4.6816
			914.011		5.7579

Duration of the bond is 5.758 years.

Alternatively, as per short cut method.

$$D = \frac{1+YTM}{YTM} - \frac{(1+YTM) + t(c-YTM)}{c[(1+YTM)^t - 1] + YTM}$$

Where YTM = Yield to Maturity

C = Coupon Rate

T = Years to Maturity

$$= \frac{1.09}{0.09} - \frac{1.09 + 7(0.0675 - 0.09)}{0.0675[(1.09)^7 - 1] + 0.09} = 5.72$$

(C) Volatility of Bond-

$$\text{Volatility} = \frac{\text{Duration}}{(1+\text{YTM})} = \frac{5.758}{(1+0.09)} = 5.28$$

(2) Required yield of new investor

$$= 67.50 \times \text{PVIAF}(r,7) + 1050 \times \text{PVIF}(r,7)$$

NOW, let us discount the cash flow by 9%

$$\text{PV @ 9\%} = 67.50 \times 5.032 + 1050 \times 0.547$$

$$= 339.66 + 574.35 = 914.01$$

$$\text{NPV @ 9\%} = 914.01 - 897$$

$$= ₹17.01$$

Since, NPV of bond is positive, we need to increase discount rate say 12%

$$= 67.50 \text{ PVIAF}(12\%, 7) + 1050 \times \text{PVIF}(12\%,7)$$

$$= 67.50 \times [0.893+0.797+0.712+0.636+0.567+0.507+0.452] + 1050 \times 0.452$$

$$= 67.50 \times 4.564 + 474.60$$

$$= 308.07 + 474.60$$

$$= 782.67$$

$$\text{NPV @ 12\%} = 782.67 - 897$$

$$= - ₹114.33$$

Now we use interpolation formula

$$k_e = \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times \Delta r$$

$$= 9\% + \frac{17.01}{17.01 - (-114.33)} \times 3\%$$

$$= 9\% + 0.39\% = 9.39\%$$

(ii) Relationship between the price of the bond & YTM is opposite or inverse

### Futures Different From Equity Options

**6.(C)“Investing in Stock Futures differs from investing in Equity Options in several ways”. Explain.**

**ANSWER: 6(C)**

Investing in stock futures differs from investing in equity options contracts in several ways:

- **Nature:** In options, the buyer of the options has the right but not the obligation to purchase or sell the stock. However, while going in for a long futures position, the investor is obligated to square off his position at or before the expiry date of the futures contract.
- **Movement of the Market:** Options traders use a mathematical factor, the delta that measures the relationship between the options premium and the price of the underlying stock. At times, an options contract's value may fluctuate independently of the stock price. In contrast, the future contract will much more closely follow the movement of the underlying stock.
- **The Price of Investing:** When an options investor takes a long position, he or she pays a premium for the contract. The premium is often called a sunk cost. At expiration, unless the options contract is in the money, the contract is worthless and the investor has lost the entire premium. Stock future contracts require an initial margin deposit and a specific maintenance level of cash for mark to market margin.

## MTP 2

### Portfolio Rebalancing with Constant Proportion Portfolio Insurance Policy

**Question 1: (B) Shiva has a fund of ₹ 5 lacs which he wants to invest in share market with rebalancing target after every 15 days to start with for a period of one month from now. The present NIFTY is 17025. The minimum NIFTY within a month can at most be 15322.50. He wants to know as to how he should rebalance his portfolio under the following situations, according to the theory of Constant Proportion Portfolio Insurance Policy, using "2" as the multiplier:**

- (1) Immediately to start with.**
- (2) 15 days later-being the 1st day of rebalancing if NIFTY falls to 16321.89.**
- (3) 15 days further from the above date if the NIFTY touches 17512.14.**

**Note: Assume that the value of his equity component will change in tandem with that of the NIFTY.**

**Answer:**

$$\text{Maximum decline in one month} = \frac{17025 - 15322.50}{17025} \times 100 = 10 \%$$

(1) Immediately to start with

$$\begin{aligned} \text{Investment in equity} &= \text{Multiplier} \times (\text{Portfolio value} - \text{Floor value}) \\ &= 2 (5,00,000 - 4,50,000) \\ &= ₹1,00,000 \end{aligned}$$

Shiva may invest ₹ 1,00,000 in equity and balance in risk free securities.

(2) After 15 days

$$\text{Value of equity} = 1,00,000 \times 16321.89 / 17025 = ₹ 95,870$$

$$\text{Value of risk free investment} \quad \quad \quad ₹ 4,00,000$$

$$\text{Total value of portfolio} \quad \quad \quad = ₹ 4,95,870$$

$$\begin{aligned} \text{Investment in equity} &= \text{Multiplier} \times (\text{Portfolio value} - \text{Floor value}) \\ &= 2 (4,95,870 - 4,50,000) \\ &= ₹ 91,740 \end{aligned}$$

Revised Portfolio:

$$\text{Equity} = ₹ 91,740$$

$$\begin{aligned} \text{Risk free Securities} &= ₹ 4,95,870 - ₹ 91,740 \\ &= ₹ 4,04,130 \end{aligned}$$

(3) After another 15 days

$$\text{Value of equity} = 91,740 \times 17512.14 / 16321.89 = ₹ 98,430$$

$$\text{Value of risk free investment} = ₹ 4,04,130$$

$$\text{Total value of portfolio} = ₹ 5,02,560$$

$$\text{Investment in equity} = \text{Multiplier} \times (\text{Portfolio value} - \text{Floor value})$$

$$= 2 (5,02,560 - 4,50,000) = ₹ 1,05,120$$

Revised Portfolio:

$$\text{Equity} = ₹ 1,05,120$$

$$\text{Risk Free Securities} = ₹ 5,02,560 - ₹ 1,05,120 = ₹ 3,97,440$$

The investor should off-load ₹ 6,690 of risk free securities and divert to Equity.

**Weights of Portfolio allocation based on Portfolio Beta**

**Question 2: (A) On the basis of given information, Mr. XLY want to create a portfolio equally as risky as the market and is having ₹ 20,00,000 to invest.**

<b>Assets</b>	<b>Investment</b>	<b>Beta</b>
<b>Stock A</b>	<b>₹ 4,00,000</b>	<b>0.70</b>
<b>Stock B</b>	<b>₹ 5,00,000</b>	<b>1.10</b>
<b>Stock C</b>	<b>?</b>	<b>1.60</b>
<b>Debenture (D)</b>	<b>?</b>	<b>0</b>

**How do you recommend and interpret the risk scenario and investment in all the securities?**

**Answer:**

Let  $W_A$ ,  $W_B$ ,  $W_C$  and  $W_D$  be the weights of Stock A, B, C and Debenture respectively.

$$W_A = 4,00,000 \div 20,00,000 = 0.20$$

$$W_B = 5,00,000 \div 20,00,000 = 0.25$$

$$\text{Now } W_C + W_D = 1 - W_A - W_B = 0.55$$

It is given in the question that Portfolio should be as risky as that of the market. It means Beta of the portfolio should be 1.

Hence,

$$W_A (0.7) + W_B (1.1) + W_C (1.6) + W_D (0) = 1$$

$$0.2 \times 0.7 + 0.25 \times 1.1 + 1.6W_C + W_D \times 0 = 1$$

$$0.14 + 0.275 + 1.6W_C + 0 = 1$$

$$1.6W_C = 1 - 0.415$$

$$1.6 W_C = 0.585$$

$$W_C = \frac{0.585}{1.6}$$

$$= 0.3656$$

$$\text{Weight of Debenture } (W_D) = 1 - 0.2 - 0.25 - 0.3656$$

$$= 0.1844$$

Hence, Amount invested in Stock C

$$= 0.3656 \times 20,00,000$$

$$= ₹ 7,31,200$$

Amount invested in Debenture (D)

$$= 0.1844 \times 20,00,000$$

$$= ₹ 3,68,800$$

Thus, amount to be invested in Stock (C) is ₹ 7,31,200 and in Debenture is ₹ 3,68,800.

## Sell Side Imperatives in Merger & Acquisition

**Question 2: (c) Explain some of the ‘sell-side’ imperatives in Mergers & Acquisitions.**

**Answer:**

The following are some of the ‘sell-side’ imperatives

- Competitor’s pressure is increasing.
- Sale of company seems to be inevitable because company is facing serious problems like:
  - No access to new technologies and developments
  - Strong market entry barriers. Geographical presence could not be enhanced
  - Badly positioned on the supply and/or demand side
  - Critical mass could not be realised
  - No efficient utilisation of distribution capabilities
  - New strategic business units for future growth could not be developed
  - Not enough capital to complete the project
- Window of opportunity: Possibility to sell the business at an attractive price
- Focus on core competencies
- In the best interest of the shareholders – where a large well known firm brings-up the proposal, the target firm may be more than willing to give-up.

## Factors affecting the value of an option

**Question 6: (C) Explain briefly the various factors that affect the value of an Option.**

**Answer:**

Factors affecting the value of an option are:

(a) **Price Movement of the Underlying:** The value of calls and puts are affected by changes in the underlying stock price in a relatively straightforward manner. When the stock price goes up, calls should gain in value and puts should decrease. Put options should increase in value and calls should drop as the stock price falls.

(b) **Time till expiry:** The option's future expiry, at which time it may become worthless, is an important and key factor of every option strategy. Ultimately, time can determine whether your option trading decisions are profitable. To make money in options over the long term, you need to understand the impact of time on stock and option positions.

With stocks, time is a trader's ally as the stocks of quality companies tend to rise over long periods of time. But time is the enemy of the options buyer. If days pass without any significant change in the stock price, there is a decline in the value of the option. Also, the value of an option declines more rapidly as the option approaches the expiration day. That is good news for the option seller, who tries to benefit from time decay, especially during that final month when it occurs most rapidly.

- (c) **Volatility in Stock Prices:** Volatility can be understood via a measure called **Statistical Volatility**, or SV for short. SV is a statistical measure of the past price movements of the stock; it tells you **how volatile** the stock has actually been **over a given period of time**.

But to give you an accurate fair value for an option, option pricing models require you to put in what the future volatility of the stock will be during the life of the option. Naturally, option traders don't know what that will be, so they have to try to guess. To do this, they work the options pricing model "backwards" (to put it in simple terms). After all, you already know the price at which the option is trading; you can also find the other variables (stock price, interest rates, dividends, and the time left in the option) with just a bit of research. So, the only missing number is future volatility, which you can calculate from the equation.

- (d) **Interest Rate:** Another feature which affects the value of an Option is the **time value of money**. The **greater the interest rates, the present value of the future exercise price are less**.