



SECTION- 2

INTEREST RATE RISK

This Section includes

- **What is Interest Rate Risk?**
- **Quantifying interest rate risk - Gap analysis**
- **Interest rate risk management products**

2.1. WHAT IS INTEREST RATE RISK?

2.1.1 Interest rate risk is the risk of gain or loss from the rise or fall of interest rates. As all organizations are at times, lenders or borrowers, this is of great importance. The users of capital are fundamentally concerned about interest rate risk as it affects the cost of raising funds thereby the profitability and viability of business.

2.1.2 Example

A corporate bond with a face value of Rs. 100 and a coupon rate of 8% matures in two years with a bullet repayment. What is the price of the bond if the yield to maturity is 8%, 6% and 10%?

- Yield to maturity is the market expected rate of return for this class of bonds
- Price of the bond is the present value of cash flows from the bond (coupon and principal repayment), discounted at the Yield to maturity rate.
 - (a) at 8% the price of the bond is 100
 - (b) at 6% the price of the bond is 103.67
 - (c) at 10% the price of the bond is 96.53

2.2. QUANTIFYING INTEREST RATE RISK - GAP ANALYSIS

2.2.1 A company may be borrowing and lending at the same time. For example, consider a bank. We can treat all positive and negative cash flows as a portfolio and if properly time-slotted, the exposure is directly related to the absolute amount of the net cash flow for each period. If there is net surplus, the organization can lose money if the interest rates decline and vice versa for a shortage. There is some natural reduction in overall risk if surpluses in some periods are matched by shortages in others. A table is prepared to show the portfolio of cash surpluses and shortfalls over time. This is known as gap analysis.

2.2.2 Duration:

The gap analysis system gives a useful overall view of the exposure, but it is not helpful when considering the value of an individual asset or liability. Duration is a useful measure in assessing the interest rate exposure of a specific bond or a debt instrument.

Let us take the example of two bonds, namely A and B. Both instruments will mature in five years.

Bond	A	B			
Coupon	3%	10%			
Maturity	5	5	Years		
YTM	7%				
Comparison of bonds A and B for different YTMS					
YTM	Price of A	Change(%)	Price of B	Change(%)	
3%	100.00		132.06		
5%	91.34	-9%	121.65	-8%	
7%	83.60	-8%	112.30	-8%	
10%	73.46	-12%	100.00	-11%	

For both the bonds, the value falls as YTM increases. But, we find that Bond A

is more susceptible to interest rate changes when compared to Bond B because the cash flow sequences differ. A measure that captures this sensitivity is the weighted average maturity of the bond, known as the duration. In other words, it is the average measure of time for waiting to receive the cash flows from a bond.

2.2.3 Computation of Duration:

Time	Cash flows _A	PV CF _A	(Time)X(PVCF _A)		
1	3	2.80	2.80		
2	3	2.62	5.24		
3	3	2.45	7.35		
4	3	2.29	9.15		
5	103	73.44	367.19		
		83.60	391.73	Duration	4.69

Time	Cash flows _A	PV CF _A	(Time)X(PVCF _A)		
1	10	9.35	9.35		
2	10	8.73	17.47		
3	10	8.16	24.49		
4	10	7.63	30.52		
5	110	78.43	392.14		
		112.30	473.96	Duration	4.22



Note: Duration is measured by dividing $[\text{Time} \times \text{PVCF}_A]$ by PVCF_A

The lower the duration, less is the interest rate of that bond. Duration is a measure of the interest rate risk, which can be used to compare various classes of bonds and categorize them in order of their exposure, measured by duration.

2.2.4 The interest rate risk can be managed by matching the duration of assets with the duration of the liabilities. For example, if we need to raise debt finance to proceed with a project, by ensuring that the duration of the 'debt portfolio' is reasonably matched to that of the project's cash flows, we can reduce significantly the interest element of the total project risk. The matching has to be on one-to-one basis. Otherwise, aggregate amounts might tally but when average costs & returns vary, the net effect will also have serious implications.

2.3. INTEREST RATE RISK MANAGEMENT PRODUCTS

2.3.1 There are two types of interest rate risk management products:

1. Forward rate agreements (FRAs) and interest rate futures
2. Swaps

Sources of Risk

Affecting both P&L and Balance Sheet.

- Interest Rate risk;
 - floating rate interest;
 - fixed rate borrowings and floating rate investments;
- Exchange risk;
 - need not even operate in foreign market;
 - inter-linkages between various markets.
- Default risk;
 - inability or unwillingness;
- Liquidity risk;
 - bankruptcy;
 - even profitable firm may be liquidity risk;
 - excess funds also cause for concern.
- Business risk;



- internal & external;
- strike; death of key person; break-down; obsolescence;
- govt.policy; competition; customer preference;
- Financial risk;
 - like liquidity risk;
 - bankruptcy;
 - working capital structure is a reason;
- Market risk / price risk;
 - depletion in value of investment due to market movements;
 - mostly due to interest rate risk and exchange risk;
- Marketability risk;
 - not readily marketable;
 - need not be linked to need for funds;
 - If so, non-marketability may lead to liquidity risk.

This is only illustrative and not exhaustive.

2.3.2 Derivatives:

The above products are known as derivatives. A derivative is a financial product whose performance is based on the price movement in an underlying asset; the asset might be a bond, share or lump of gold. A derivative can be bought or sold without buying the underlying the asset.

2.3.3 FRAs and Interest rate futures lock in interest rates. The main difference is that FRAs are over-the-counter (OTC) deals offered by particular financial institutions while future contracts are exchange-traded. Exchange traded means the contracts can be only traded through the exchange i.e exchange is the counter party for every transaction, while OTC refers to bilateral trade or contract between private parties typically between a financial institution and a customer. Between OTC and exchange traded decisions, the choice is to balance convenience against cost.

2.3.4 **Hedging** is the generic term used to mean reduction of financial risk, by the use of financial products.