# Session -6

We will learn SWAP through stories and also learn Interest Rate derivatives like Interest Rate Futures (IRF). NISM XIII covers SWAPS from an elementary levels and we will try to cover the concepts that often comes in the exam. Here we will learn some advanced topics like Credit Default Swaps (CDS) and other important topics and terminologies.

**Duration 60-90 Minutes**

# 2 Little Boys had a 2 Little Toys !!

Rohan

**Rohan wants risk, un predictability and more excitement. Rohan is a naughty Boy !!**

Horse with a rocker would remain in the same place and do nothing and hence predictable in its behaviour

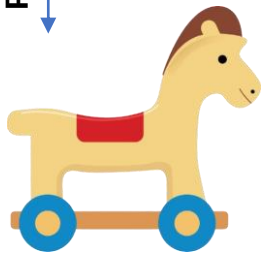

Predictability

SWAP

Risk & Volatility

Prem

**Prem wants No risk, predictability and Less excitement. Prem is a good Boy !!**



Horse with Wheels would be Zooooooooming up and down Hills making it un predictable in its movement.





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# 20 years later

Prem

Agrees to pay INR 2000 irrespective of the PLR + 3%

SWAP

Rohan

Either

2000 > (PLR + 3%)

Rohan makes Money !!

Either

2000 < (PLR + 3%)

Rohan Looses Money !!

Takes the loan Liability

Needs a loan
Rate: PLR + 3%

Unpredictability in Interest amount

Starts a Food Business






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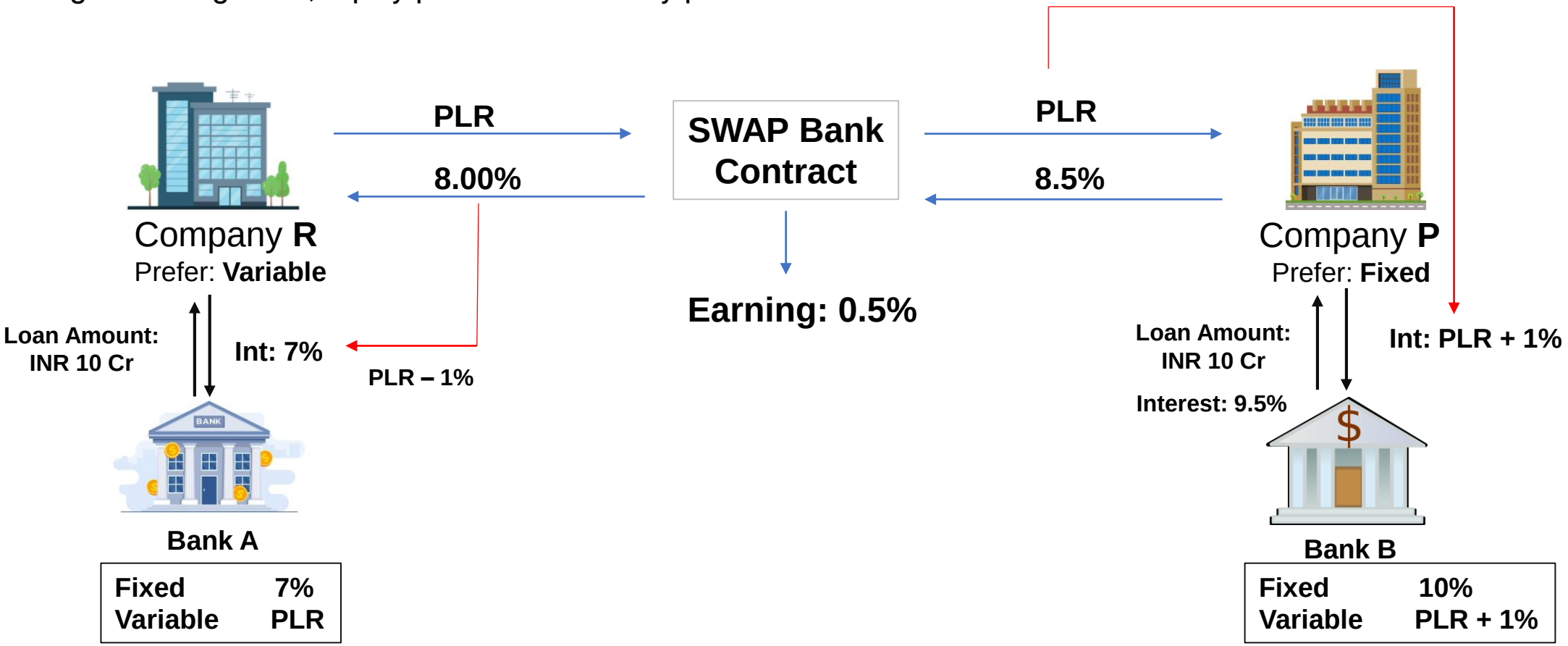
# SWAP Contract

A **Swap Contract** is an agreement between two parties to exchange sequences of cash flows for a set period.
Usually, at the time the agreement is initiated, the cash flow is determined by uncertain variables, such as interest rate, foreign exchange rate, equity price or commodity price.



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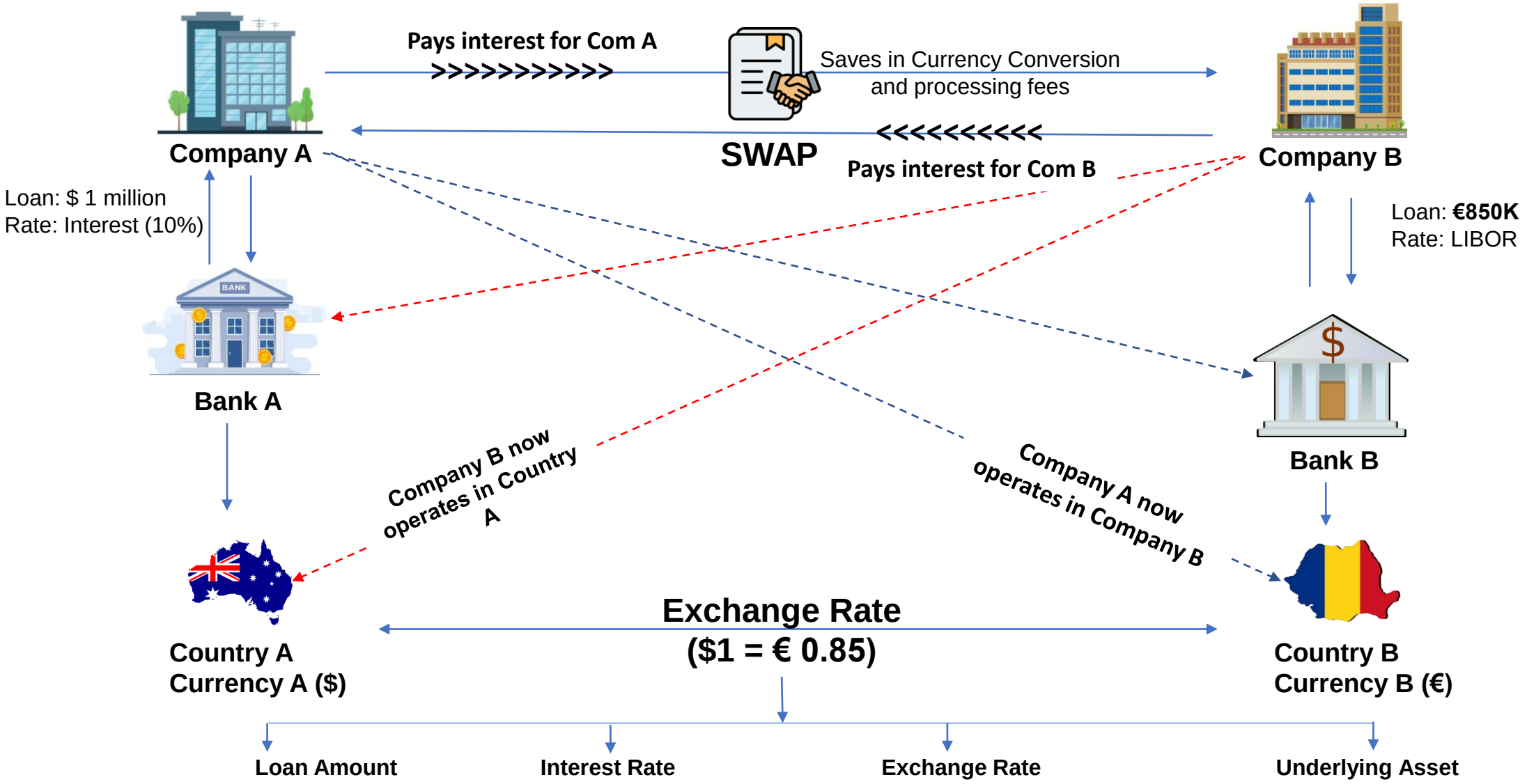
# Currency Swap !!





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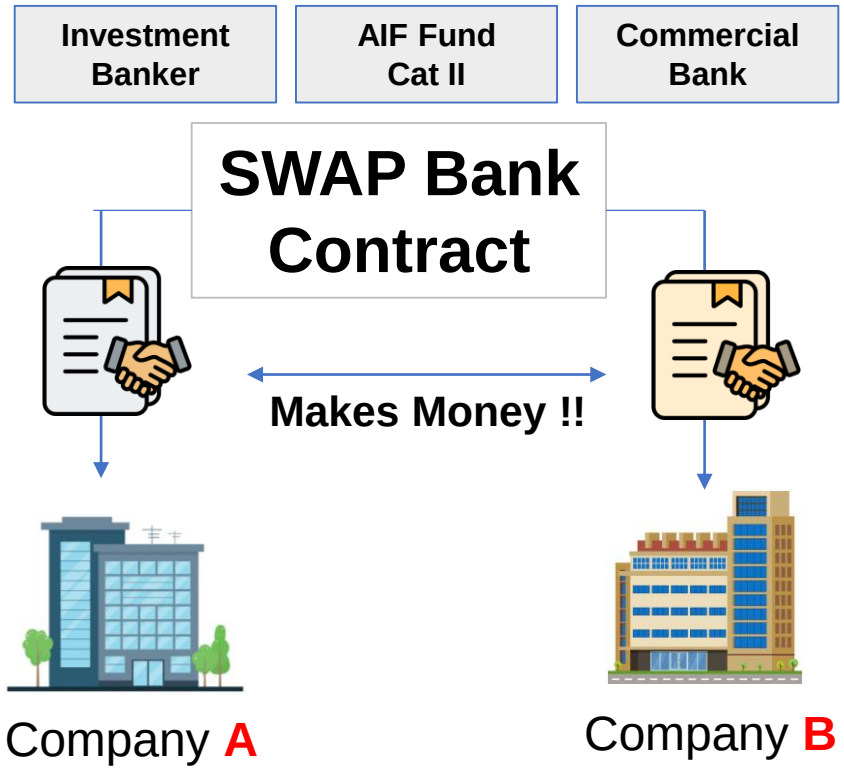
# SWAP Bank – A Currency Swap

A **Swap Bank** is a financial institution or intermediary that facilitates **swap agreements** between two parties. It acts as a **market maker** for interest rate swaps, currency swaps, and other derivative contracts. The swap bank either **matches counterparties** with complementary needs or **takes on the risk itself** by acting as a counterparty in the swap transaction.

Swap banks can operate in **two ways**:

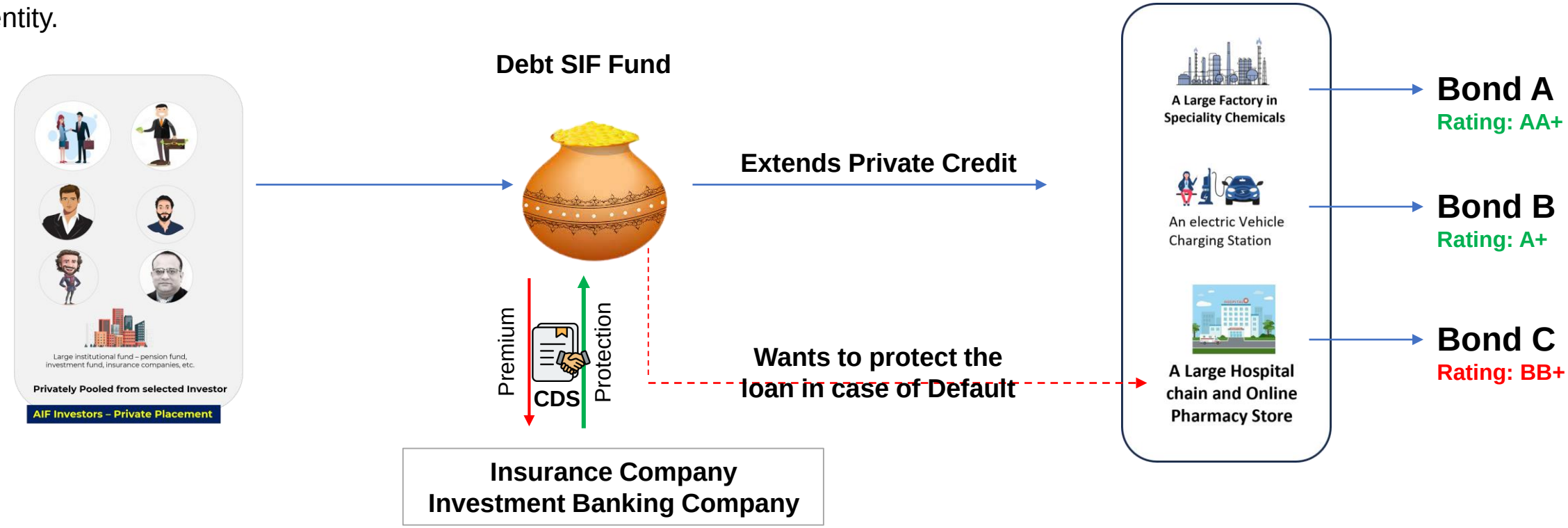
**1.Broker** – Simply finds two parties with offsetting needs and charges a commission for the service.
**2.Dealer** – Acts as a counterparty to both sides of the swap, assuming risk in exchange for potential profit.
Swap banks play a crucial role in managing financial risks related to interest rates, exchange rates, and credit exposures for corporations, governments, and investors.



# Credit Default SWAP

A **Credit Default Swap (CDS)** is a financial derivative that acts as a form of insurance against the default of a borrower. It is a contract between two parties where the **buyer** of the CDS makes periodic payments to the **seller** in exchange for protection against the risk of a credit event, such as **default, bankruptcy, or restructuring** of a specified debt instrument (e.g., corporate bonds or government bonds).

If a default occurs, the **CDS seller** compensates the **buyer** by either paying the face value of the debt or delivering the defaulted asset in exchange for payment. CDSs are widely used by investors to hedge credit risk or speculate on the creditworthiness of an entity.



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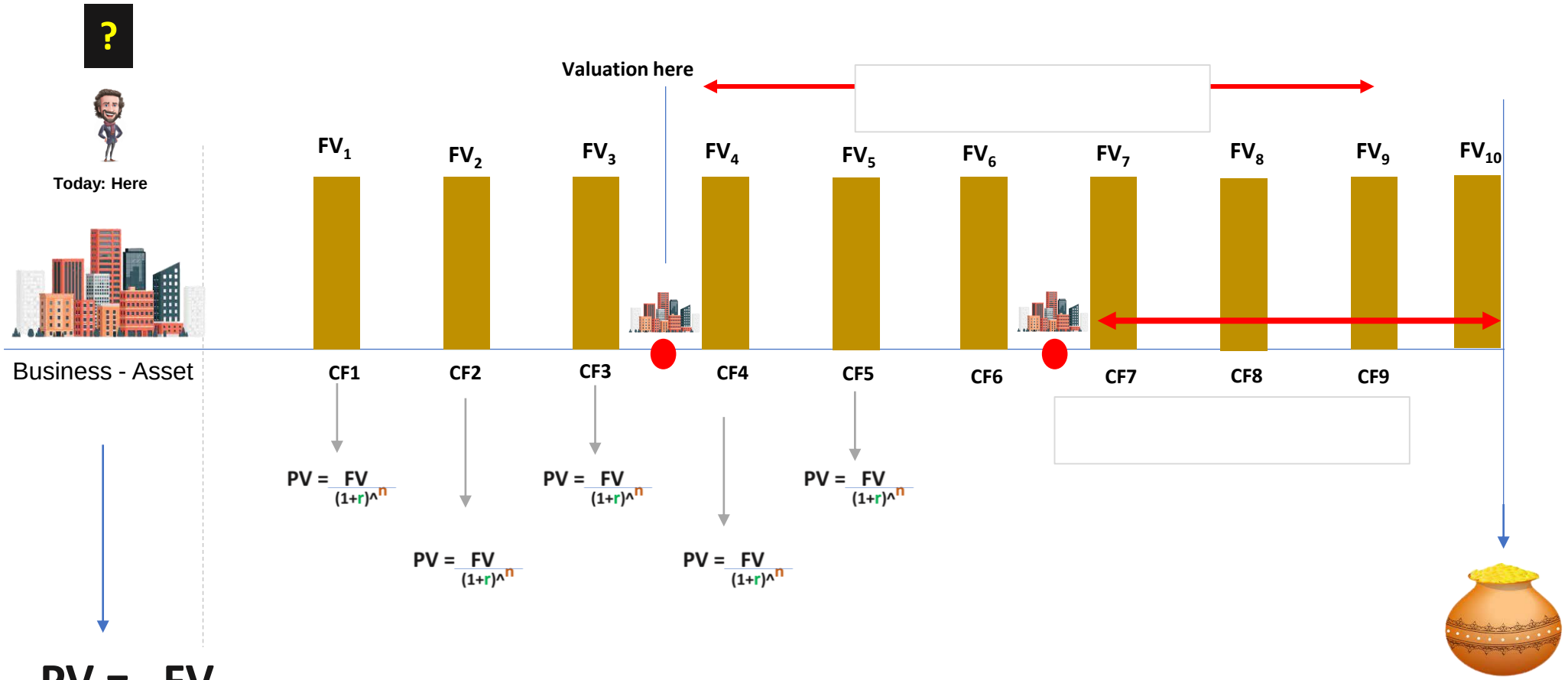
# Compounding & Discounting




$$PV = \frac{FV}{(1+r)^{t}}$$

**Concept of Discounting**

$$FV = PV\,(1+r)^{t}$$

**Concept of Compounding**





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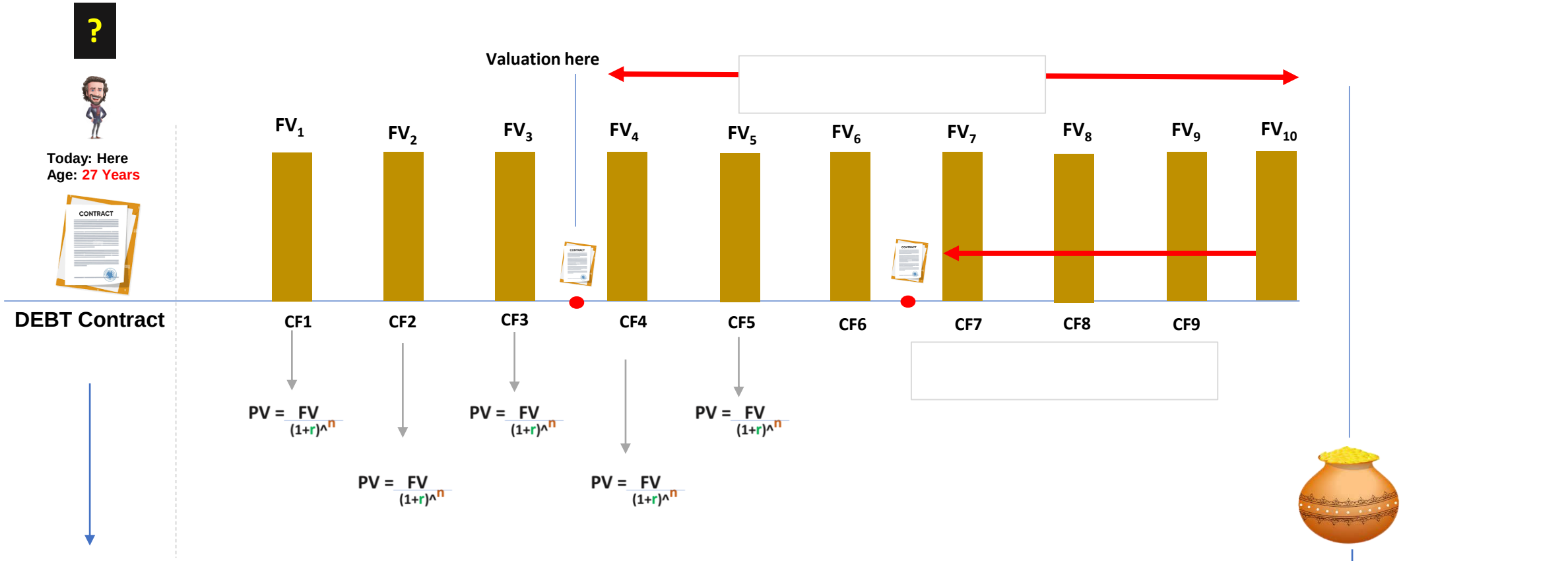
# Compounding & Discounting




$$PV = \frac{FV}{(1+r)^{t}}$$

**Concept of Discounting**

$$FV = PV\,(1+r)^{t}$$

**Concept of Compounding**





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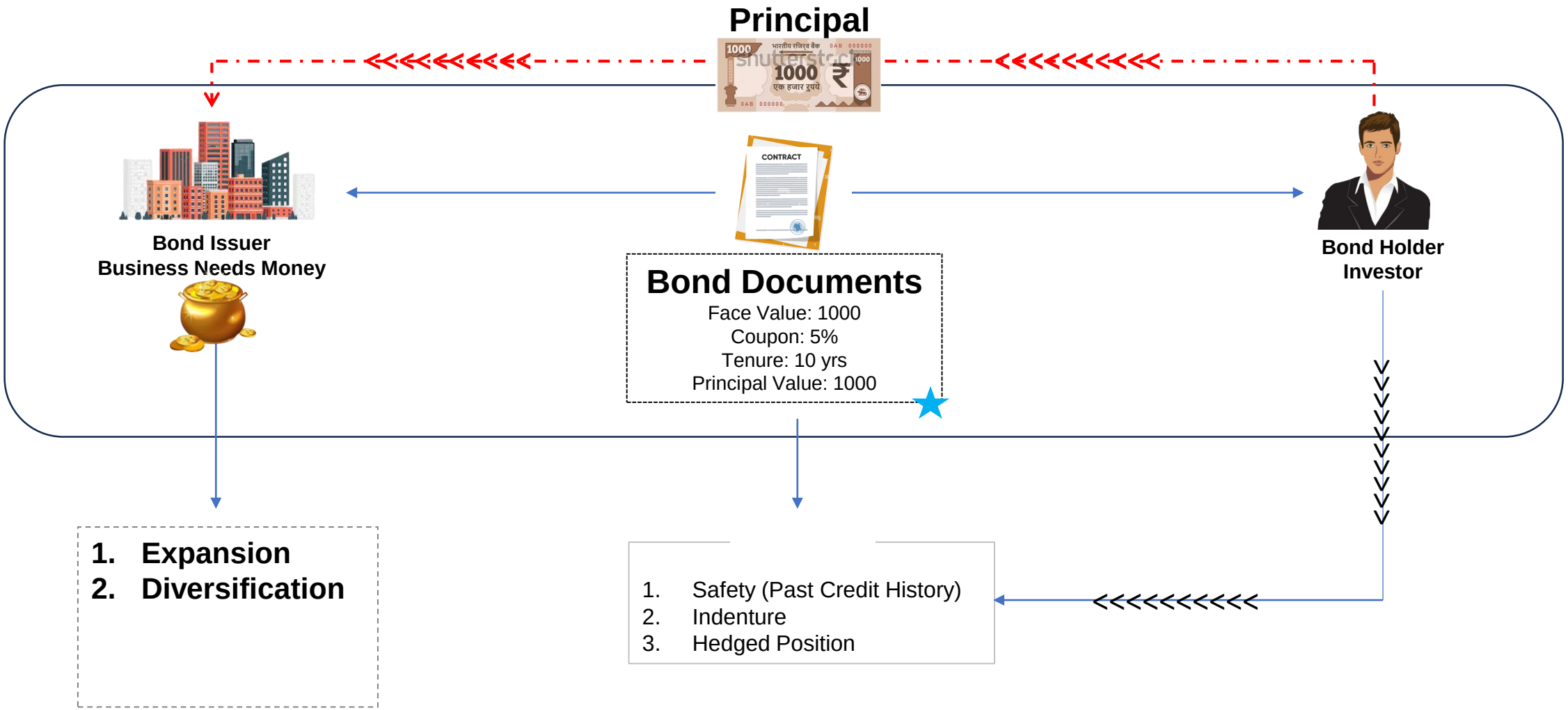
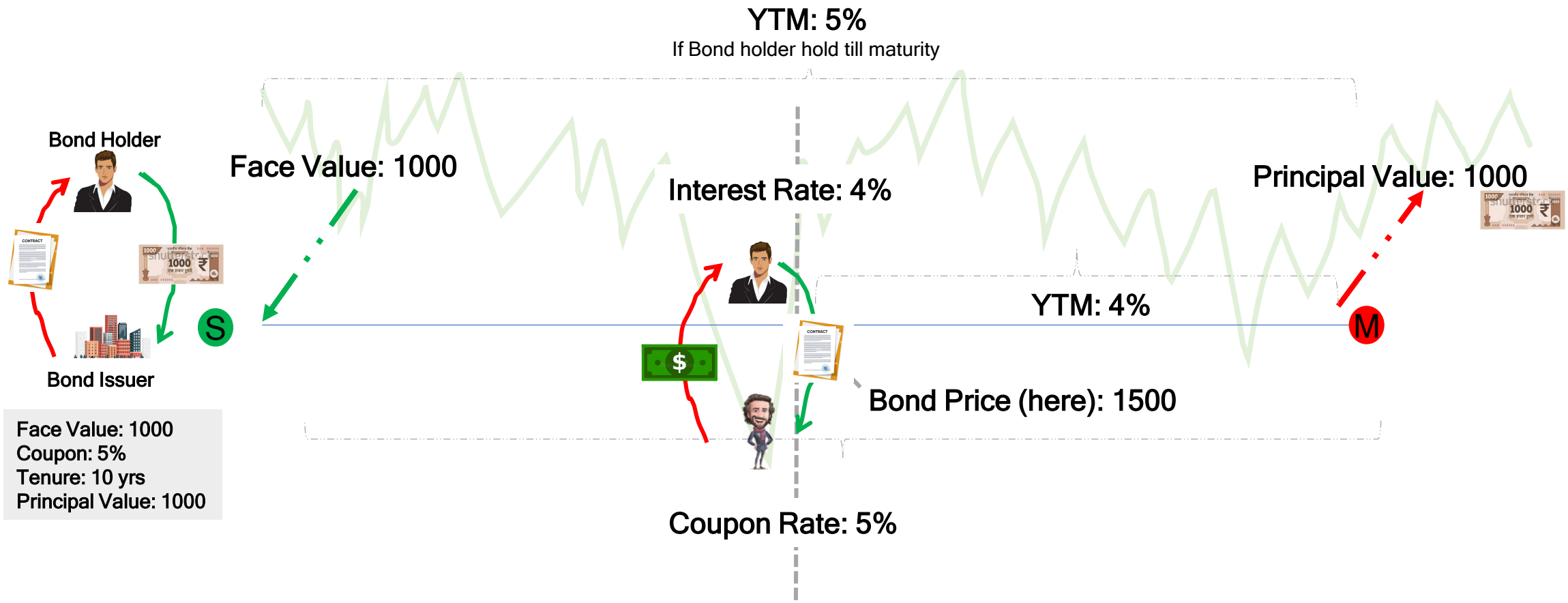
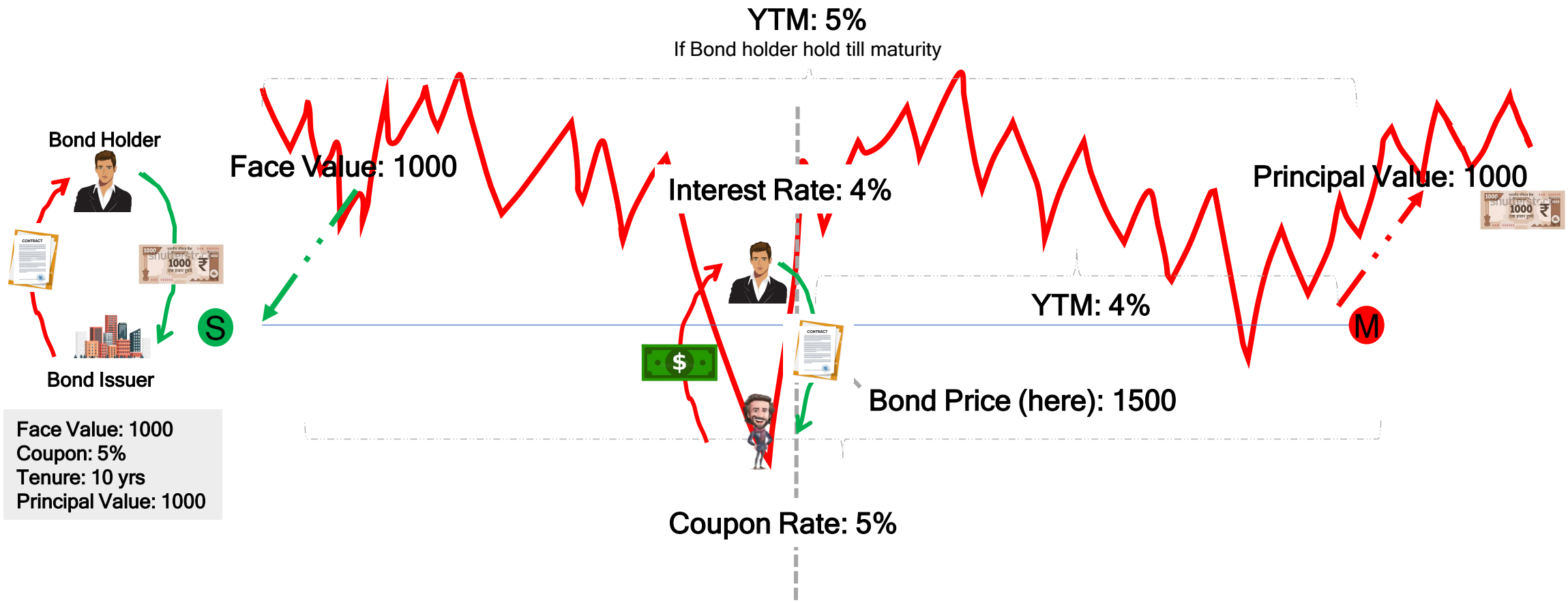
# Understanding Debt



# How Bond market works?



# How Bond market works?



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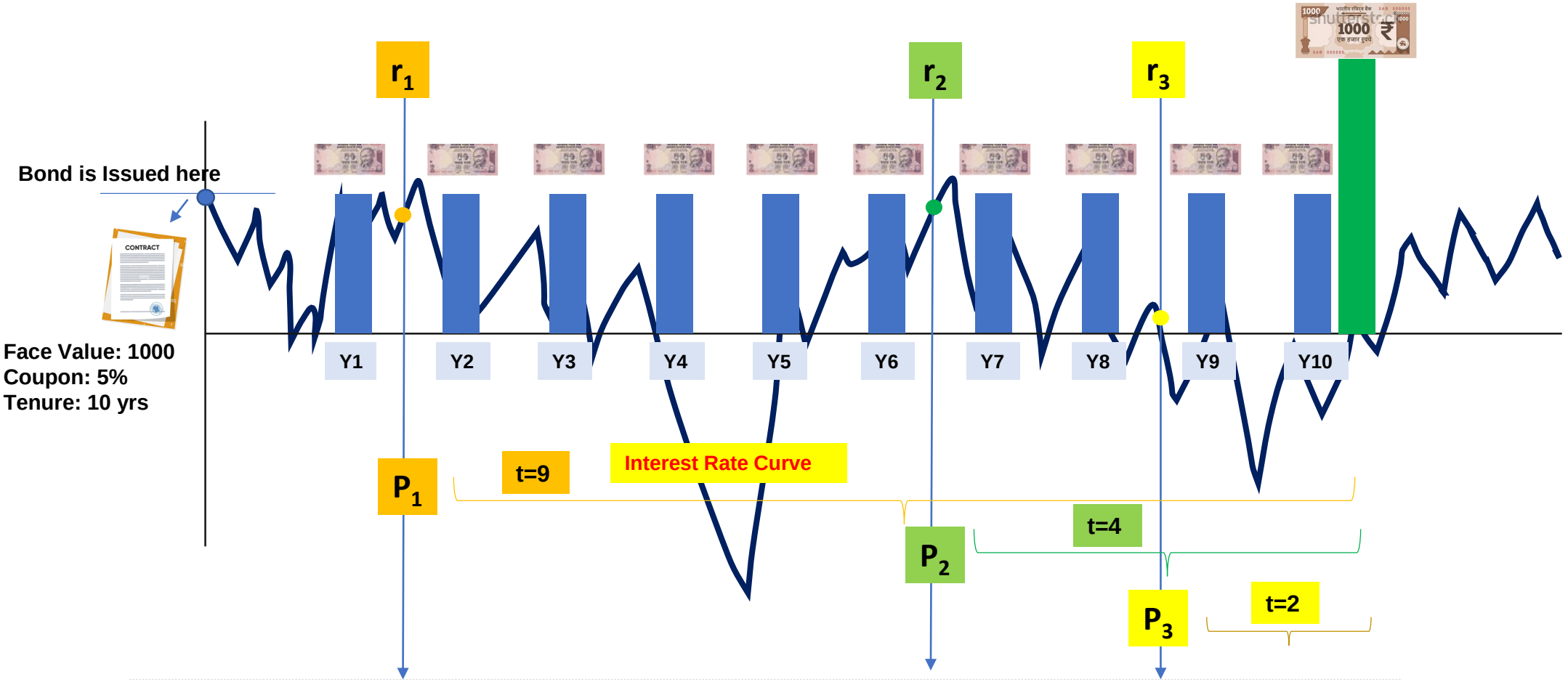
# Calculating the Fair Value of the Bond!



# Measuring Yield

## Yield Measure

**Assumption:**
Coupon: 5%
Face Value: 1000
Market Value: 991
Interest Rate: 6%

1

Measure of
**Coupon Yield**

**Coupon** Yield = 5/1000 = 5%

2

Measure of
**Current Yield**

**Current** Yield = 5/991 = 5.05%



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# Let's Discuss

The price of a bond (of Rs 100 face value) is Rs 97. It has a coupon rate of 8.5%. What is the current yield ?

A. 0.80%

B. 8.53%

C. 8.76%

D. 9.70%

Answer

C

# The PUT Options Contract

**Debt Instrument**– Rs.2 Lakh (Face Value) –
**Indenture: PUT OPTION**
**Coupon: 8%**
**Period**: 10 Year (Maturity Period)
PUT option: after 5 years at PAR Value

**Suppose:**
You buy a 10-year puttable bond with a 5% coupon, face value ₹1000. The bond has a put option after 5 years. After 5 years, market interest rates rise, and similar bonds are now offering 7%. In this case, you can exercise your put option and sell the bond back to the issuer at ₹1000 instead of continuing to receive lower interest (5%) while new bonds are paying more (7%).

**Romit Barat**

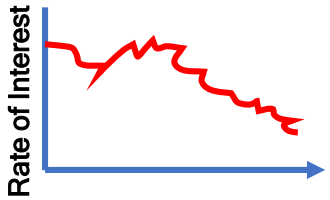
**PUT Option BUYER**


**Romit Barat pays INR 1,00,000 and buys a Fixed Income Instrument with a PUT Option from ABC Yarn Pvt Ltd**

**PUT Option - SELLER**

**AMC Yard Pvt Ltd**

**Scenario - 1**

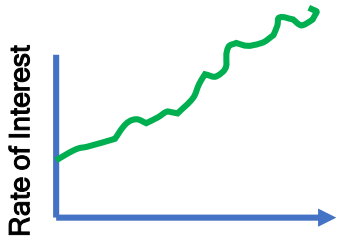



**Interest Rate declines to 6%**
**Romit do not execute PUT Options**

**Scenario - 2**


**Interest Rate remain Unchanged**
**Romit do not execute PUT OPTION**

**Scenario - 3**




**Interest Rate rises to 10%**
**Romit executes PUT OPTION**
**and buy high Yield bind at 10%**



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# Bond Rating

Bond Issuer


Raising 10,000 Dollar
Rating: BBB+


Raising 1000 Dollar
Rating: AAA+


Bond Holder



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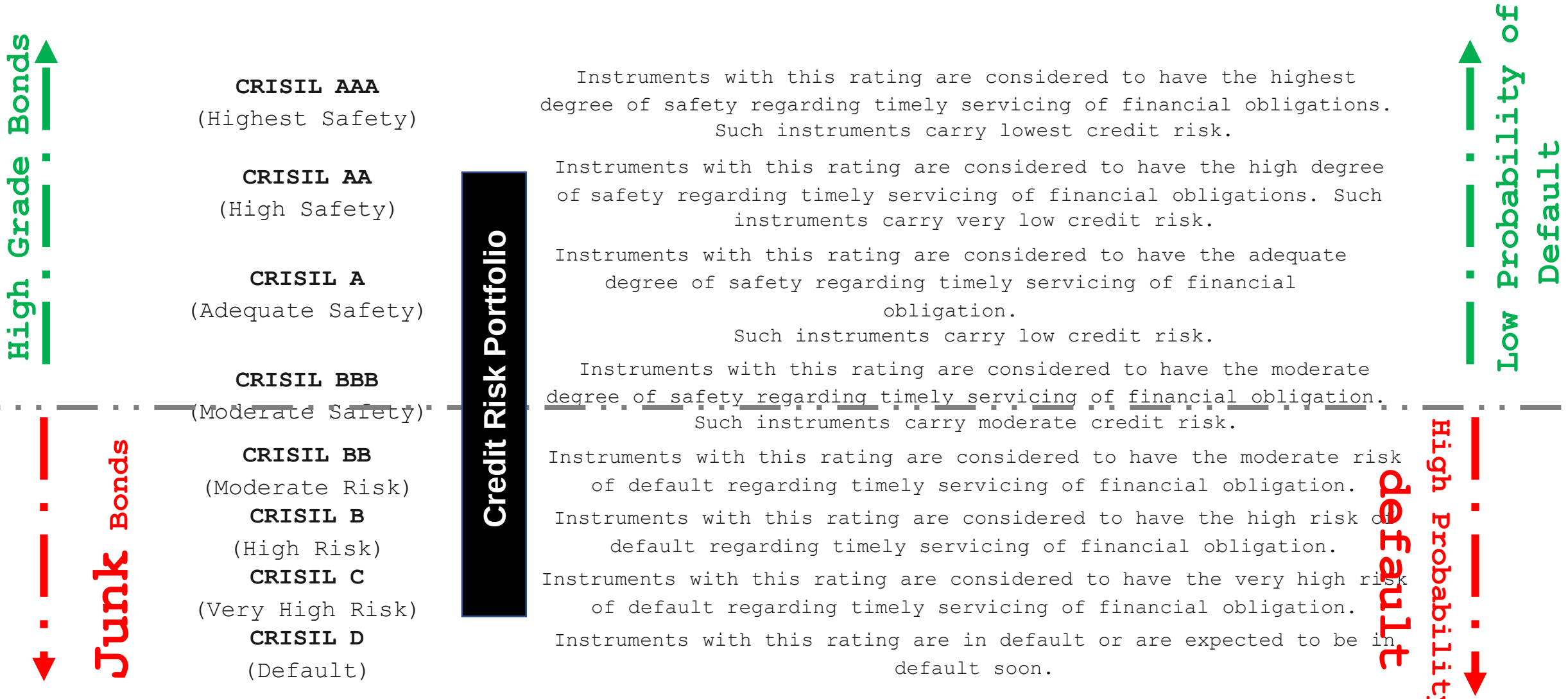
# Long Terms - Ratings



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# Short Terms - Ratings

High Grade Bonds

Junk Bonds

Low Probability of default

High Probability of default

| | |
|---|---|
| **CRISIL A1** (Highest Safety) | Instruments with this rating are considered to have very strong degree of safety regarding timely payment of financial obligations. Such instruments carry lowest credit risk. |
| **CRISIL A2** (High Safety) | Instruments with this rating are considered to have strong degree of safety regarding timely payment of financial obligations. Such instruments carry low credit risk. |
| **CRISIL A3** (Risky) | Instruments with this rating are considered to have moderate degree of safety regarding timely payment of financial obligations. Such instruments carry higher credit risk as compared to instruments rated in the two higher categories. |
| **CRISIL A4** (High Credit Risk) | Instruments with this rating are considered to have minimal degree of safety regarding timely payment of financial obligations. Such instruments carry very high credit risk and are susceptible to default |
| **CRISIL D** (Default) | Instruments with this rating are in default or expected to be in default on maturity. |

**Bond X and Bond Y are issued by the same issuer and have the same maturity. Bond X is priced at 98 and Bond Y at 101.50 Which of the two bonds is a better investment?**

# Primary Metric of Return – YIELD (1)

**Yield** refers to how much income an investment generates, separate from the principal. It's commonly used to refer to interest payments an investor receives on a bond or dividend payments on a stock. Yield is often expressed as a percentage, based on either the investment's market value or purchase price.

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**Yield in fixed Income Scenario:**

For example, let's say bond A has a ₹1,000 face value and pays a semiannual coupon of ₹10. Over one year, bond A yields ₹20, or 2%. This is known as the cost yield because it's based on the cost or value of the bond.

However, most people buy bonds on the secondary market and not directly from the issuer, meaning they pay more or less than face value. If you're considering purchasing the same bond A for ₹900, the ₹20 coupon payments based on the current ₹900 price would be a yield of 2.2%. This is known as the current yield because it's based on the current price of the bond.

**Yield in Equity Scenario:**

Yield is also a commonly used term when discussing dividend stocks. For example, let's say you purchase 100 shares of XYZ for ₹50 (₹5,000 total). Each quarter, XYZ pays a dividend of 50 cents per share. Over a year, you would receive ₹200 in dividend income (50 cents x 4 quarters = ₹2 x 100 shares). Your initial investment of ₹5,000 yielded 4% (₹200 / ₹5,000 x 100).

# BOND - DURATION

The **duration of a bond** measures the sensitivity of the bond's full price (including accrued interest) to changes in the bond's yield-to-maturity or, more generally, changes in benchmark interest rates.

Bond duration estimates changes in bond price assuming that variables other than yield-to-maturity or benchmark rates are held constant. Further, time-to-maturity is also unchanged.

Generally, the higher the duration, the higher the drop in the price of the bond as interest rates rise. As a general rule, for every 1% change in interest rates, the price of a bond will change by approximately 1% in the opposite direction for every year of duration.

**For example,**

if a 10-year bond has a duration of 7 years, its price will rise by about 7% (= 1% × 7) if the interest rate drops by a percentage point (100 basis points). Similarly, its price will fall by about 7% if the interest rate rises by that amount.



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# 📘 Clean Price vs Dirty Price (Bond Market Style):

### 🔹 Clean Price:

1. This is the quoted price of the bond – the price excluding any accrued interest.
2. It's the "neat" price used in newspapers, market quotes, and trading screens.
3. Used for valuation and trading without mixing interest calculations.

🔹 Example:
Bond trading at ₹102 (clean price), means ₹102 per ₹100 face value, excluding any earned interest.

### 🔹 Dirty Price:

1. This is the actual price paid by the buyer, including the accrued interest since the last coupon payment.
2. It's called "dirty" because it mixes in the interest that the seller has earned up to the trade date.

🔹 Example:
Same bond has ₹2 accrued interest → Dirty Price = ₹102 (clean) + ₹2 (accrued) = ₹104

💡 Formula:
Dirty Price = Clean Price + Accrued Interest

🔹 Why this difference?
Because bonds pay periodic interest (coupons), and between two coupon dates, the seller earns partial interest. So buyer has to compensate for that via dirty price.



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# Factors - DURATION

## Time to Maturity

The **Time to Maturity** is an important factors that affects the Bond Duration. The longer the maturity the higher the duration.

## Example:

If a friend owed you 100$ and had to return you after 5 days you wouldn't mind. But the sensitivity would change if the friend owed you for net 20 years. So the time to maturity is directly linked to Duration or sensitivity to price and change of interest rate.

## Coupon Rate

The **Coupon Rate** is another important factors that affects the Bond Duration. The larger the coupon rate the lower the duration. If the bond has a high coupon rate that means that every year you are getting higher payment and wouldn't be concerned about the duration. Because larger coupon will give you larger money and you are able to recover your expenses from the bond sooner.

## Example:

Consider a Zero Coupon bond where all the coupon payment will happen the end of the maturity and hence the Duration is equal to the time to maturity.

# Factors - DURATION

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**For example,**

Consider a Zero Coupon bond where all the coupon payment will happen the end of the maturity and hence the Duration is equal to the time to maturity.

# Concept of Modified Duration

One of the popular measures of measuring interest rate risk in a bond is Modified Duration. It is a good measure of price sensitivity of a Bond for a given change in the market interest rates, yields, or required rates of return of the bond investor.

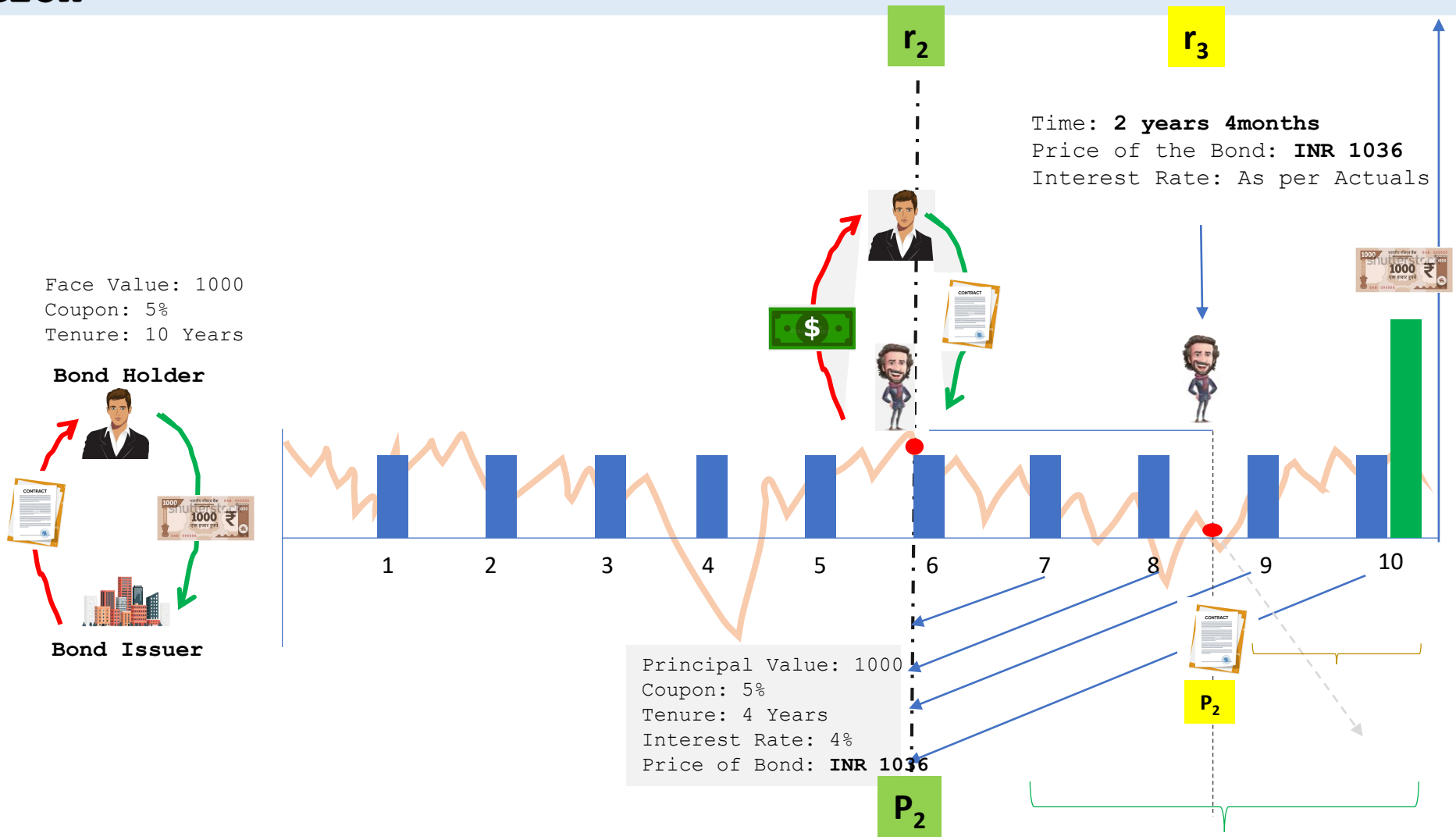
The approximate change in price of a bond for a given change in market interest rates can be estimated using the modified duration as follows

**% change in the price = (-) Modified Duration * Change in market interest rates in decimals * P**
**Where, P = Initial Price**

$$\Delta P \approx -(\text{Modified Duration} \times \Delta y \times P)$$

The negative sign indicates that there is an inverse relation between movement of interest rate and price, when one goes up, the other goes down.

# Understanding Macaulay's Duration




It is the weighted average time required to recover the Principal amount or the Investment amount.

As per Macaulay Duration, for a 1% rise in interest rate, the price of 4 year zero-coupon bond will fall by roughly_____



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As per Macaulay Duration, for a 1% rise in interest rate, the price of 4 year zero-coupon bond will fall by roughly____

For zero-coupon bonds, the Macaulay Duration = Maturity (=4)

So in this case:

Bond maturity = 4 years

Macaulay Duration = 4

**Price Fall = Duration X Change in rate = 4 X 1% = 4%**



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**The price of a bond is Rs 100. The Yield to Maturity (YTM) is 8% and the Modified duration is 4. If the YTM changes by 2%, the bond price will change by_____**

A. 10%

B. Rs 8

C. 2%

D. Rs 4

## Answer: INR 8.00

Given:
Bond Price = ₹100
YTM = 8%
Modified Duration = 4
Change in YTM = 2% (i.e. 0.02)

**Price Fall** = Mod. Duration X Change in rate = 4 X 1% = 4%



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# Interest Futures – a note

An **Interest Rate Future** is a **contract** where you agree **today** to **buy or sell a debt instrument** (like a government bond or T-bill) **at a future date**, at a **price decided today**, based on **interest rate movements**.

## How It Works:

If interest rates rise, bond prices fall and similarly, If interest rates fall, bond prices rise. So, you can trade interest rates without owning bonds directly!

**Example:**

**Suppose:** You think interest rates will fall (so bond prices will rise). You buy an interest rate future today at, say, ₹100.

**Later:** If rates actually fall → bond prices rise → future price rises to ₹105.

You sell and make ₹5 profit OR If you think interest rates will rise, you can sell a future now.

# Interest Futures – a note

### 📚 Simple Example:

It's an **agreement between two parties** to **exchange** (or *swap*) **interest payments** on a certain amount of money (called the "notional amount") – usually **one pays fixed** and **one pays floating**.

**BUT** – they never actually exchange the principal (the lump sum)! Only the **interest payments** are swapped.

1. **Company A** has a loan with a **floating rate** (like LIBOR + 1%).
2. **Company B** has a loan with a **fixed rate** (say 6%).

Both are not happy:

✓ Company A fears **rates will rise**.
✓ Company B thinks **rates will fall**.

❑ Company A will **pay fixed 6%** to Company B.
❑ Company B will **pay floating (LIBOR + 1%)** to Company A.

This is an **Interest Rate Swap**!

# Few Important Exam Pointers – Straight from the Hall !!

1. In Government of India (GOI) futures contracts, the underlying asset is **Actual value**
2. In the case of interest rate futures, the underlying asset is often Treasury bills, which may have their interest calculated using the **Actual/360** method.
3. Market value/ lot of GOI bond futures is **1 lot is Rs. 2 lakhs face value**
4. Currently for Interest Rate Derivatives the SEBI turnover fees is **INR 5** per crore of turnover.
5. If the base rate of Overnight MIBOR futures is 3, then its operating range will be **Rs. 3.25 ; Rs. 2.75**
6. If the treasury bills future contract changes by 100 ticks, the change in one unit of future contract will be **Rs. 125**
7. IPF ( Investor protection fund) is developed for the benefit of **Investors**
8. A type of order in which two prices are entered is **Stop limit order**
9. Offsetting long and short position in a same contracts Is allowed at **All Levels**
10. The initial price band for bond futures contracts is set by the Government of India (GOI) at **Plus/minus 5%** of the previous closing price or base price.
11. Single FPI ( Foreign portfolio investor ) can transact up to long position lim**50 billions in Indian rupees** it of
12. The DSP is the volume weighted average Futures Price (VWAP) of the trades in the **last 30 minutes** of trading.
13. In Government of India (GOI) futures contracts, the underlying asset is **Actual Value**

# Some numerical on Interest Rate Derivatives !!

An investor has a Rs. 26 Crores portfolio of GOI bonds with portfolio duration of 6.1. The bond futures have duration of 4.7. The one-month GOI bond futures price is Rs. 98.50. What is the number of futures contracts to fully hedge the portfolio?

?

**In the Prudential norms, last slide you learnt that:**

**Futures (long and short)** = Futures Price * Lot Size * Number of Contracts

For GOI, the formula is: Futures Price X $\frac{200000}{100}$

Here given: Futures Price is 98.5, So the CONTRACT VALUE = 98.5 X 2000 = 1,97,000.00

So,

Number of CONTRACT to Hedge 26 Crore of GOI Bond = $\frac{26 \text{ Cr X } 6.1}{1.97 \text{ L X } 4.7}$

= 1319.79 X 1.29

≈ 1714

Back



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# WISH you all the BEST !!