# **Session 1 - Basics**

## First steps in finance

It’s all about finance , whether its HR , public relations , marketing etc..

Building blocks

1) Structure of business

Always forward looking ( what we do in future , planning for future , not what we have done in the past)

2) cashflows

What are cashflows and why are they important??

How are earnings related with cashflows.

3) measurement of risk

4) time value of money

-- dollar today is worth more than a dollar in future.

5) Valuation

-- value of an asset is the present value of its cash flow

6) Trading fundamentals

-- markets not specifically required for business, these are just lubricants, but the important thing is how do we perform trading / business transactions

Arbitrage 🡪 why its important in finance

## 1.Concept of Business

Understanding the business structure

Assets and Liabilities

Difference between financial and Accounting BS

Financial balance sheet 🡪 not what you have already put in the assets but what these assets will give you in return in future based on what you have invested in them today. Always about future .

**2 ways to fund a business**

1) Equity 🡪 the money which we own ourselves.

2) Debt 🡪 if equity is not sufficient , we borrow money

## 2.Importance of Cashflows

Important to understand why cashflows is different to earning.

Why few business that looks good in accouting BS may not really be productive

1) contractually set in the beginning

Like a bond or loan when the business takes in the beginning

2) residual cashflows

Profits made in the business

3) contingent cashflows

If some event occurs , you have some savings kept which will be used for business

## 3.Measurement of risk

3 things to note here :

Good risk and bad risk 🡪 we need to e careful here

Risk though whose eyes, perspective of risk from govt point of view , company , shareholders , stakeholders etc..

Quantifying the risk 🡪 convert the risk into something measurable ( like a risk measure which can be adjusted)

Also understand the history of risk , how company has performed in the past helps us to assess its risk for future.

## 4.Time value of money

Dollar today is more than dollar worth tomorrow 🡪 but why??

What decides the value of asset for tomorrow ,,if there is some cashflow right now , what would be its value in future

Or if there is some cashflow in future , can we find the value for that in present to make a financial decision.

## 5.Valuation

It depends upon the type of cashflow

Ex: for contractual cashflow , like bond or loan , you discount them using the fixed amount( promised cash) when the bond was made

For equity ( residual cashflow) 🡪 discount expected cashflow what the investors expect in the cash flow

Contingent cashflow 🡪 value the asset using an option pricing model

## 6.Trading

Financial markets where buying / selling is happening

Investors would like to get 100% profits ( but that’s impossible , you need to take risk most of the times)

At the same time , there are 2 kinds of frictions that every investor need to go through:

1) trading costs

2) taxes ( govt imposed taxes)

# **Session 2 – Structure of a business**

## Financial Balance Sheet

Assets and Liabilities

2 types of assets

1. **Assets in place** 🡪 value of investments you have already made as a company in the history. 🡪 current wealth / value of a company

2 . **Growth Assets** 🡪 future value of investments done today

Debt 🡪 borrow money 🡪 whatever profits are earned, these will get distributed to the Lenders first and then only company

Equity 🡪 value get after meeting the debt obligations (own money, no debt involved)

1. Assets in place 🡪 ex: for an automobile company these are the plants which are already setup. Company is reaping the benefits for such assets.

Ex : Microsoft 🡪 Assets in place 🡪 Windows and Microsoft

For ex: if the asset is performing good, then its ROI will be greater than the capital money spent initially (this is forward looking) and vice versa (backward looking).

**2. Growth Assets**

Again, its ROI that matters, not the money spent in acquiring these assets.

Value of GA will be :

1) higher 🡪 if ROI is high

2) lower -> low ROI (profit is low, not much cashflow, assets not getting much returns)

3) Negative 🡪 value invested (capital money is more) and ROI is less than money invested.

Asset value is declining but we still continue to invest. Loss of money.

Debt

3 ways to find out the cashflow is debt or not

1) contractual agreement:

Fixed set of money to be given. This is signed in the agreement before hand between both parties. Floating rate debt also its possible but the cashflow is still fixed. Now cashflow can change with time but its fixed.

2) Failure meet this cashflow 🡪 out of business, how?? 🡪 if you have lent some money, and unable to pay to your lender, then he will take over your business. Bankrupt.

3) payments made are tax deductible, meaning no additional tax need to be paid to govt when you are returning money to lender.

Equity

Cashflow left over after everybody needs have been met.

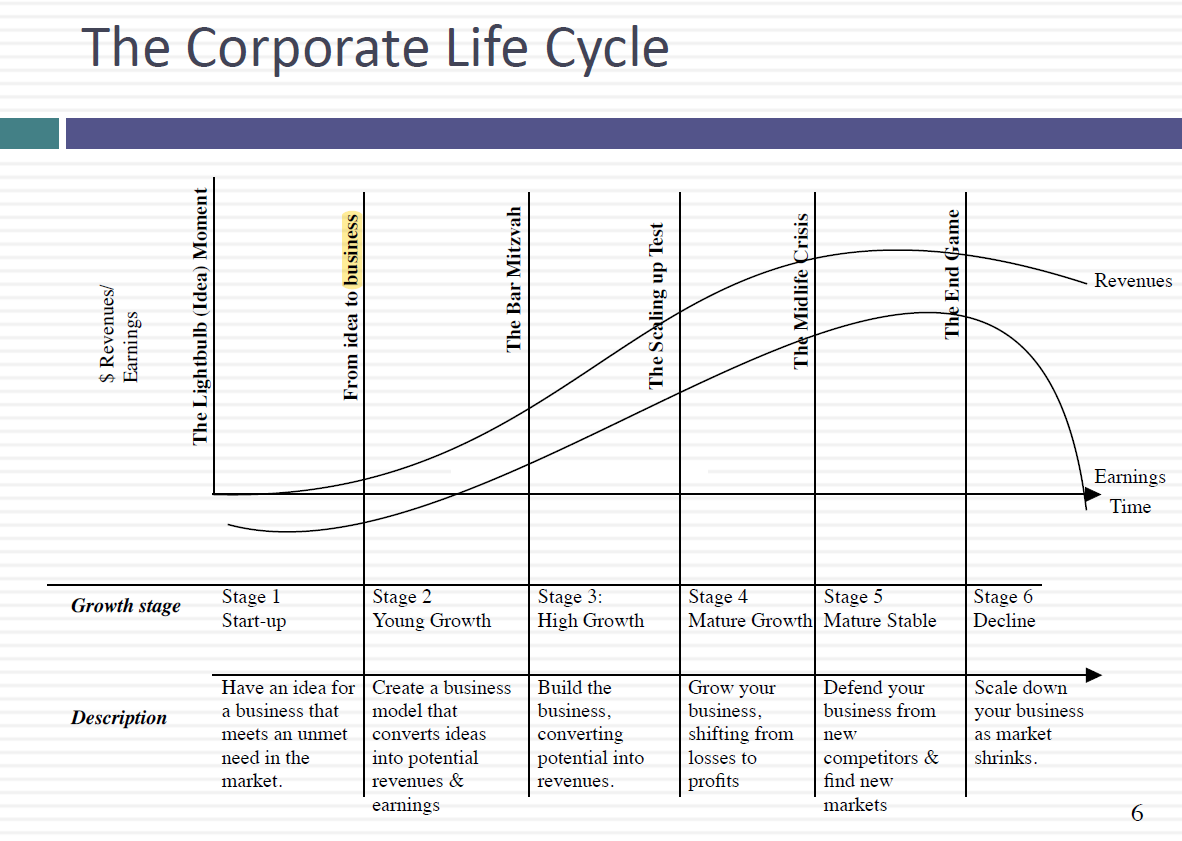
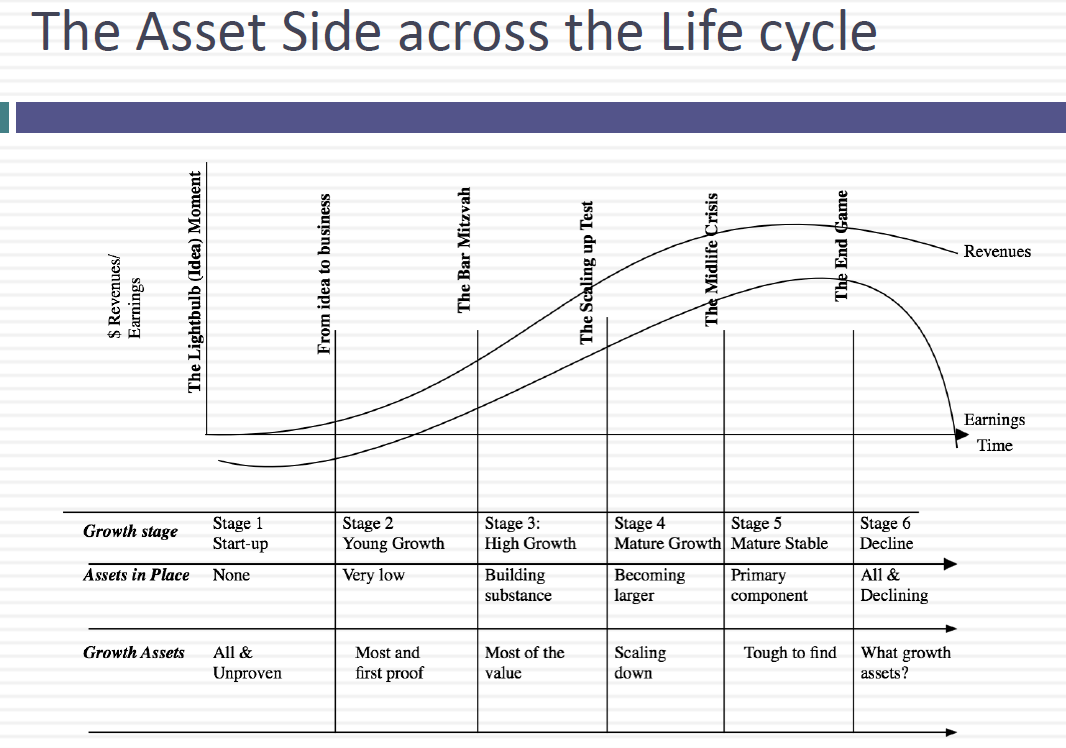
Lender needs

**Residual claim**

If we are the owner , then we have the right to take everything left after paying away all dues.

**Dividend claim**

If we are stock holder of a public company , then managers decide how much money we are going to get.

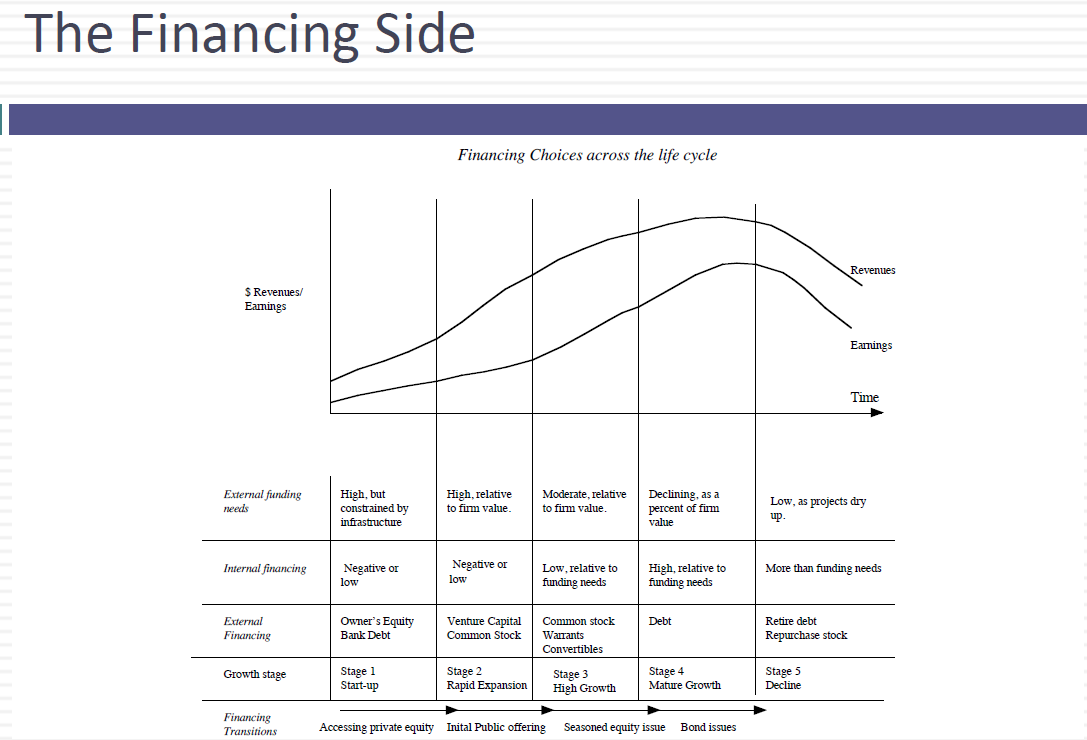
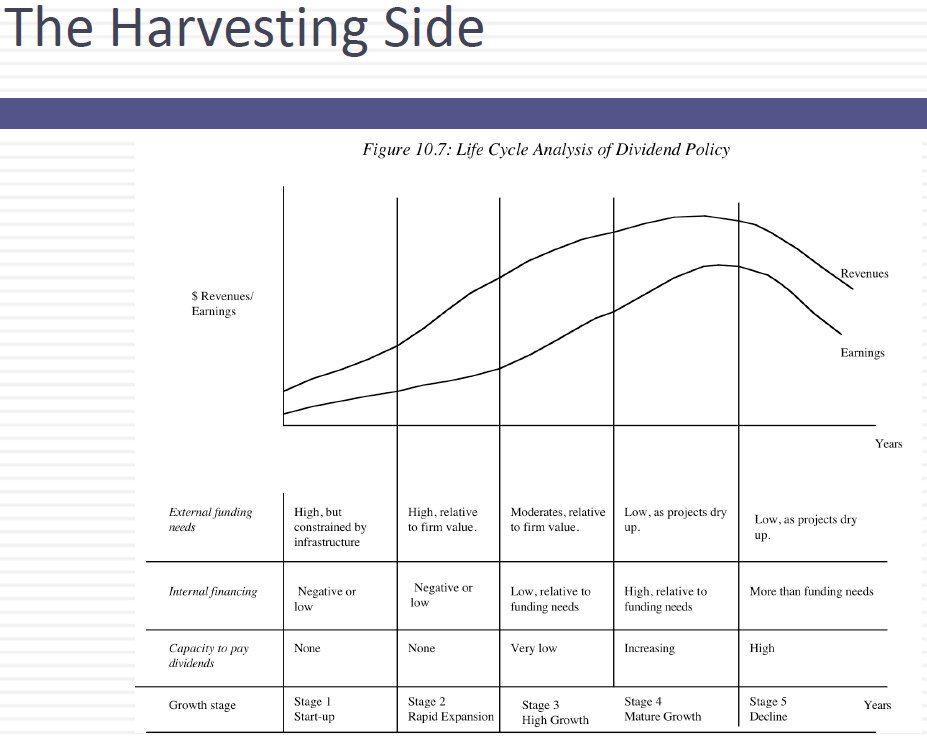
Initially company starts and its only growth assets ( no asset in place) 🡪 freshers joined and profits are coming in as everybody is motivated.

With the above motivation , the growth assets will grow 🡪 assets in place will also increase slowly but still growth assets are more dominate than assets in place.

Mature stage 🡪 Assets in place will overtake growth assets, this is the time when you are at peak.

Midlife crises 🡪 growth assets starts declining and assets in place are consumed much faster..company profits reduces. At this point of time we cant do much , even if we start building assets inplace , we are just going to destroy them even faster.

End game 🡪 decline is faster 🡪 assets in place almost 0. Growth is 0

# **Session 3 – Cashflow claims**

## Cash flow vs earnings

Why they are different?

1) Accrual accounting requires you to report transactions as they happen, not as you get paid or pay your suppliers

For ex: you perform a transaction in your business, and then you need to instantly show your revenue (even when the revenue hasn’t happened yet)

2) Accounting classifies expense into 3 groups

a. operating 🡪 labour , raw material, rent ( income statement) ( only in current year)

b. capital 🡪 exp created by the use of debt ..( don’t show up in the year they are done , they spread out over time as depreciation and amortization )

d. financial expenses 🡪 exp that create benefits over many years. Like land , building , etc ( below operating expense)

## earnings to Cashflow

if you have to convert earnings to cashflow for a business , there are only 3 things we need to do:

1) add back any accounting exp that are non-cash ( like depreciation , amortization)

-- why do we need to include them , cos they lower the cashflows

2) subtract out capital expenses in that period

3) subtract out change in non-cash working capital

## Types of cashflows

1) contractual cashflows 🡪 linked with some agreement , bond 🡪 timely money transacted between 2 parties mutually agreed upon

2) residual cashflows 🡪 equity cashflow 🡪 money left over after contractual obligations are met

3)contingent cashflows 🡪 cashflow that will happen in case of any disaster

## Contractual cashflow claims

Constant 🡪 fixed cashflow 🡪 bank loan or corporate bond

Variable 🡪 timely cashflow but the amount is variable and depends upon below:

Floating rate loan 🡪 depends upon the interest rate ( LIBOR , bond rate)

Commodity loan 🡪 for ex: interest payments may be linked with the price of a commodity like gold.

Residual cashflow this one can be negative if contractual obligations exceed the cash generated from operations ( for ex: new company)

# **Session 4- What is risk**

In general word, risk is always considered to be negative (exposing to danger)

In business and investment, risk cannot be viewed just as negative (cos if risk is only negative, then its best to just avoid it. but if we check the history, companies who have actually grown overtime have taken risk over and over based on their research and confidence)

Good and bad outcomes

## Bernoulli experiment and st. Petersburg Paradox

Exp run by Nicholas Bernoulli in 1700 ..

Coin flip 🡪 if tail you get 50 cents and it heads then game over. How much money you are willing to play the game.

What Nich found out that on average ppl willing to pay 2$.

2 other observations:

1) value attached to this gamble would vary across individuals

2) utility from gaining an additional dollar would decrease with wealth

3) Ass ppl get richer they are willing to take risk

Findings and observations how people are risk averse

1) Male vs Female 🡪 on smaller bets female are more risk averse but as the bet increases then both are same

2) Naïve vs experienced 🡪 naïve more exp less ( exp understand the business more hence willing to take risk)

3) young vs old 🡪 old are more risk averse

4) racial and cultural diff 🡪 almost same across all races

**Some unique observations of how and why ppl are risk averse**

1) framing 🡪 would you save 200/600 ppl or accept 30% chance of all ppl to be saved

Here most of them replied with 200 .. since this is confirmed.

2) Loss aversion 🡪 out of 1000$ , will you take 750$ confirmed or 75 % chance of getting entire 1000$ dollars.. again here 750$

3) Myopic loss aversion 🡪 getting continuous feed back to ppl about how their investments are performing .

4) house money effect 🡪 more risk taking on money which they have obtained easily ( like other ppl money rather than their own money) ..for ex: you obtained some money from your father as inheritance or some gift from relative 🡪 easy to invest on more risk taking stocks..

The one which you are earning 🡪 less risk taking

5) breakeven effect 🡪 like when you have lost money in a gamble you will come back and eager to put more money to win back more money ( even though the same risk is applicable now as well)

# **Session 5 – Measurement of Risk**

In general Ppl tend to pay less for more riskier investment as compared to safer investment (even when ROI is much higher than riskier investment)

## Mean variance framework

Expected return = as per theory and your estimate how much ROI you will get after investing money

Actual return = the money which you get in reality

If your actual ROI = expected ROI 🡪 then its risk-free return

In mean variance world, we assume that investors would only pick investments only for 2 below conditions:

1) expected ROI in positive

2) risk is negative

And the above can hold only if:

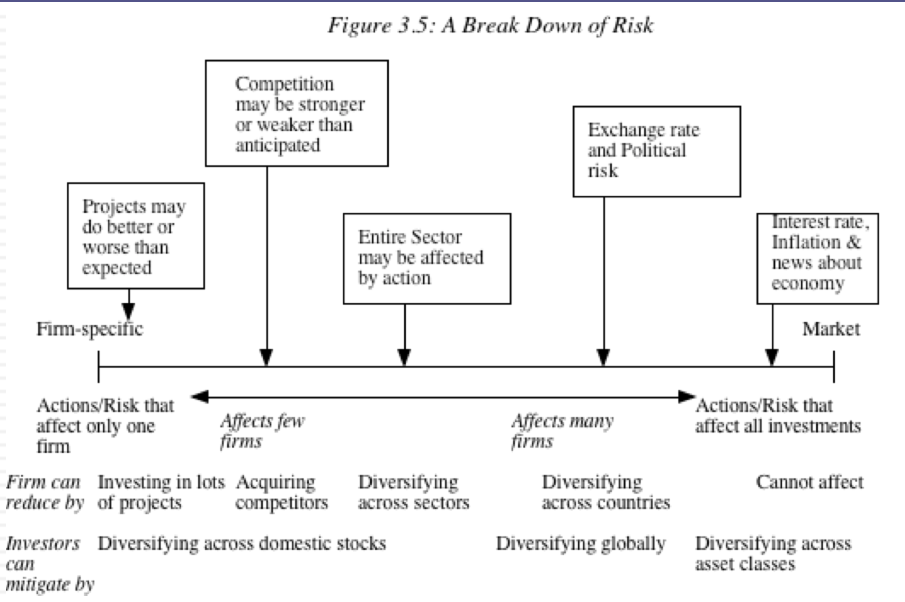
1) returns are normally distributed

2) utility functions (risk calculations) are 100% accurate

## Diversification of Risk

What all factors contribute to risk and how we can categories them.

Ex: it can be as small as related with a single project level to whole country wide economic risk



## Effects of diversification

By being diversified, reduces the firm specific risk (~law of large numbers)

Also for every bad investment that happens, there would be a good investment, in that way it will cancel out bad investments ..

Plus, even if one asset where you invested performs bad, the other assets have better chances of performing good since they belong to diff types.

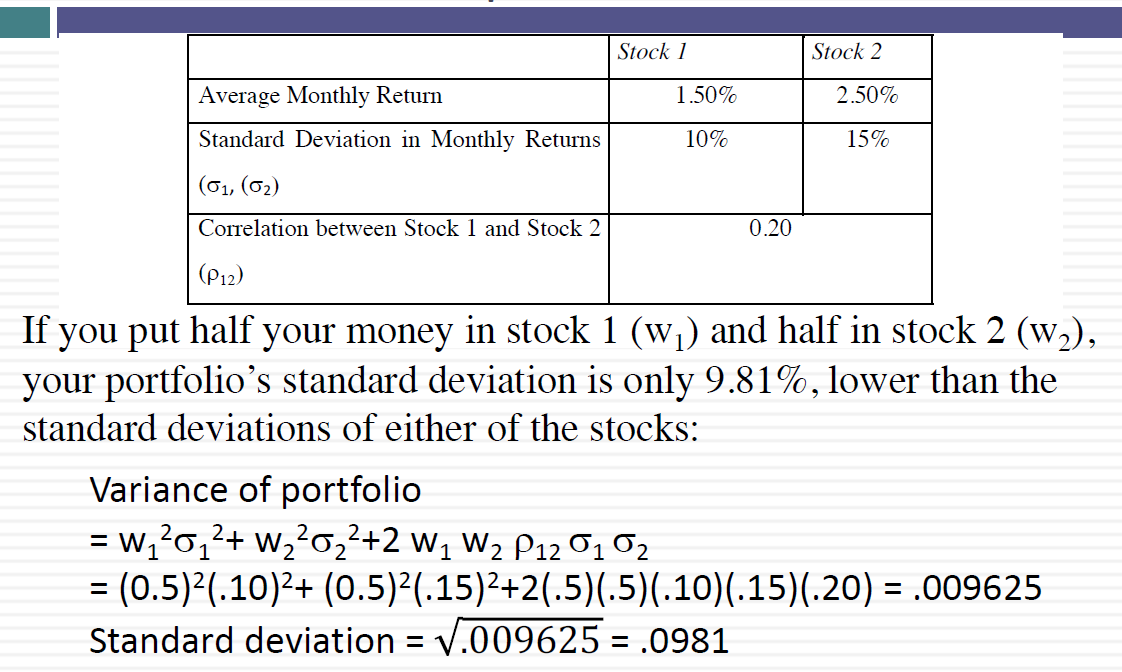
## Statistical proof of correlation

We put 50% of money ( w1 = 0.5) into stock1 and same as in stock2. Standard deviation is 9.81 that is less then standard deviation of both the stocks.

Quick observations:

The more diversified the assets are, higher benefit would be.

As you keep adding stocks (from 2 –> 3 🡪 4 ……🡪 100), marginal benefits of adding a stock, will decrease as you increase the numbers of assets in your portfolio.

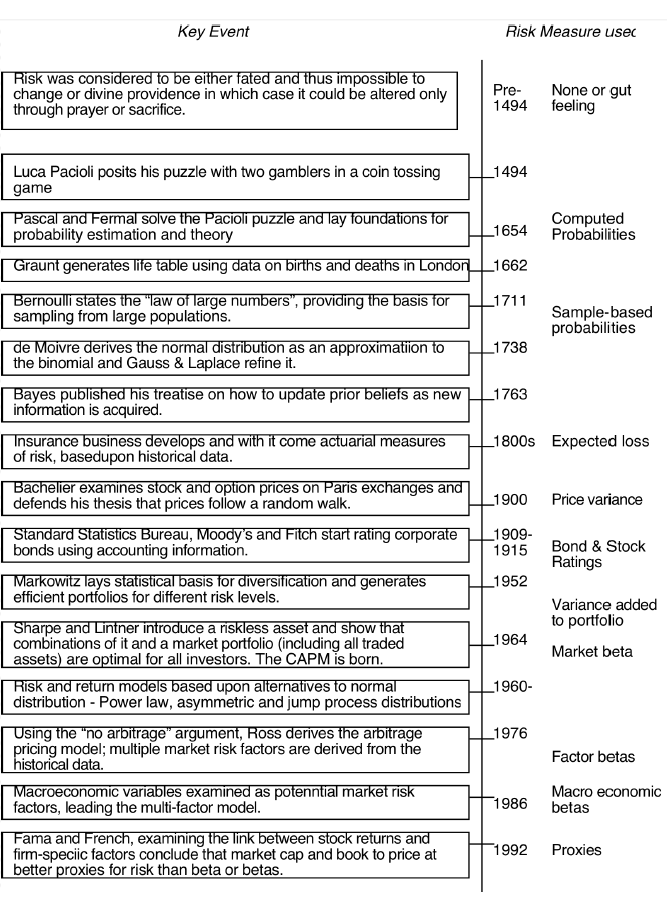


## Marginal investor (institutional investors 🡪 diversified investor)

He is the investor who is most likely to be the buyer or seller on the next trade and to influence the stock price. 2 points to describe marginal investor:

1) one who own a lot of stock and also trades lot of stock

2) ( so this may not be the owner , since owner may own lot of stock but may not trade them )..



## Market portfolio

List of assets which the investors owns and make them diversified to reduce overall risk. This collection of them is called as Market Portfolio.

For individual investors , they will reduce their risk , by keeping some of their money in riskless assets and part of that in market portfolio. Ex below:

|  |  |
| --- | --- |
| Risk Level | Allocation decision |
| No risk | 100% in riskless asset ( T bill) |
| Some risk | 50% in T bill and 50% in market portfolio |
| High risk | 100 % in Marlet portfolio |
| Risk hogg (Peak risk) | Borrow money and put all in MP |

What is risk of an individual Asset?

Measure of risk that it adds to the market portfolio. This risk can be measured by measuring how much this asset will move in relation with the market

Beta is this measure = covariance of asset // covariance of Market

Beta also measured by = ROI of an asset // ROI in general from Market

**Expected return = Risk Free Rate + Beta \* (Expected Return on the market Portfolio – Risk Free Rate)**

## CAPM (Capital Asset Pricing Model)

Arbitrage model 🡪 initial MR model 🡪 what all factors influence market risk

# **Session 6 – Time Value of Money**

## **Basic**

Dollar today is worth more than a year from tomorrow . but why is that:

1) In human nature , ppl prefer present consumption to future consumption. For instance , if we have to induce ppl to sacrifice / give away present consumption , you need to offer something in return ( this is nothing but interest)

2) Inflation causing value of currency to decrease. Higher inflation , lower value of currency. And higher diff between today currency and future currency

3) if there is any uncertainty(risk) associated with cash flow in future , less that cash flow will be valued.

For instance , if someone is willing to give money today , then ppl will be more inclined to take today instead tomorrow ( risk of that person not appearing tomorrow)

## **Discounting and compounding**

Discount rate is the rate at which the present and future cash flow are traded off.

This rate takes into considerations below points:

1) preference for current consumption (higher discount rate)

2) Expected inflation (higher discount rate)

3) uncertainty in future cash flow (high risk, higher discount rate)sd

Similar to discounting , compounding converts present cash flow into future cash flow

## **Present value Principles**

1) cash flow at different time cannot be compared and aggregated.

Diff cash flow need to be brought to same point in time , for comparison and aggregation . that point of time can be today , tomorrow or future.

2) goods investment rule will be based on not only how much cash flow but also when those cashflows are coming( taking into time factor)

## **Cash flow types and discounting mechanics**

5 types of cashflow:

1) Simple cashflow 🡪 simple return of money at specified time.

2) Annuities -> constant cashflow per year/month / specified time

3) growing Annuities 🡪 floating cashflow growing at some rate after each time interval

4) Perpetuities 🡪 constant cashflow for rest of eternity.

5) Growing perpetuity 🡪 floating cashflow growing at certain rate till eternity.

PV = FV/(1 + r)^n

FV = PV(1+r)^n

## **Power of compounding and discounting**

100 million , growth rate as 50 %

100 🡪 150 🡪 225 🡪 ….( big change you will notice)

This is compounding used in valuation

Reverse is discounting

If you know the future value , then your PV will start declining very fast.

Ie. PV = FV / ( 1+r)^n

## **Frequency of compounding**

Case 1 🡪 simple interest

PV = 100

Rate = 10%

FV after 1 year 🡪 110

Case 2 🡪 Compound interest

PV = 100

Rate = 5% ( compounded semi-annually)

FV = 110.25

How ??

Formula 🡪 FV 🡪 100 \* (1 + 0.05)^2 🡪 110.25

Explanation 🡪 105 + 105.25 🡪 110.25

**The more frequent you compound, the greater the return. in reality, do we really compound it that many times ?? yes , cos it depends upon the cash flow , if cash flow frequency is fast , then compounding time is small 🡪 return are big**

## 

## **Present value of an annuity**

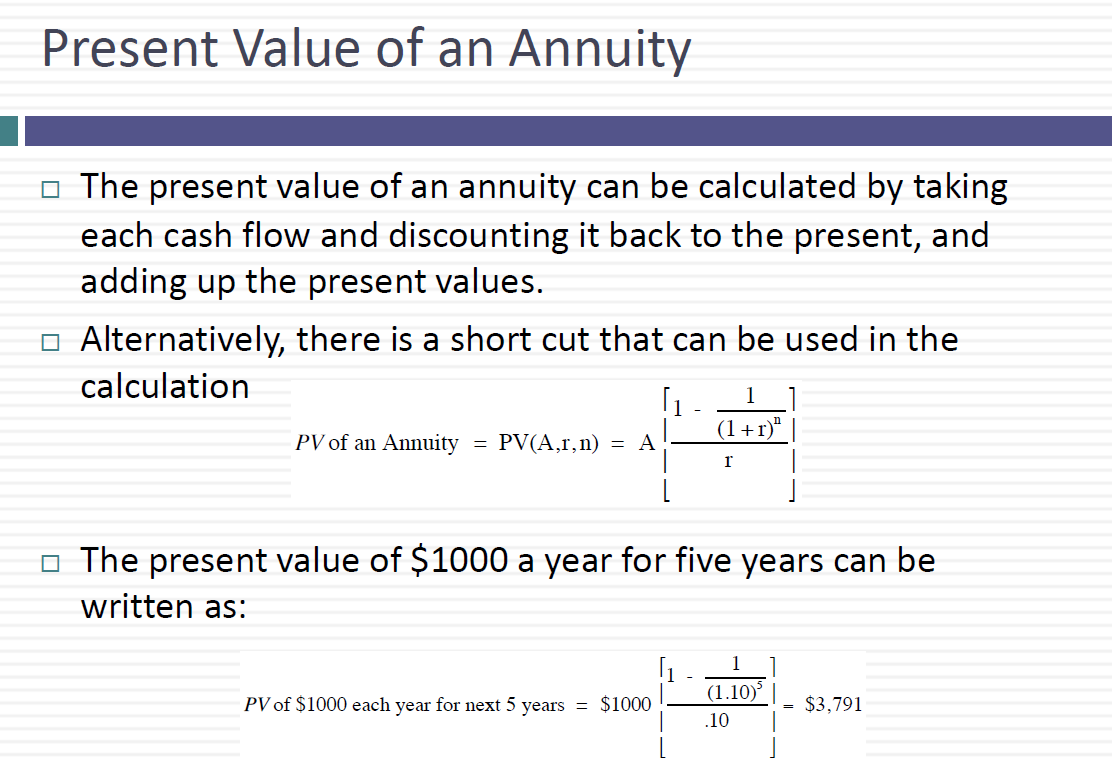
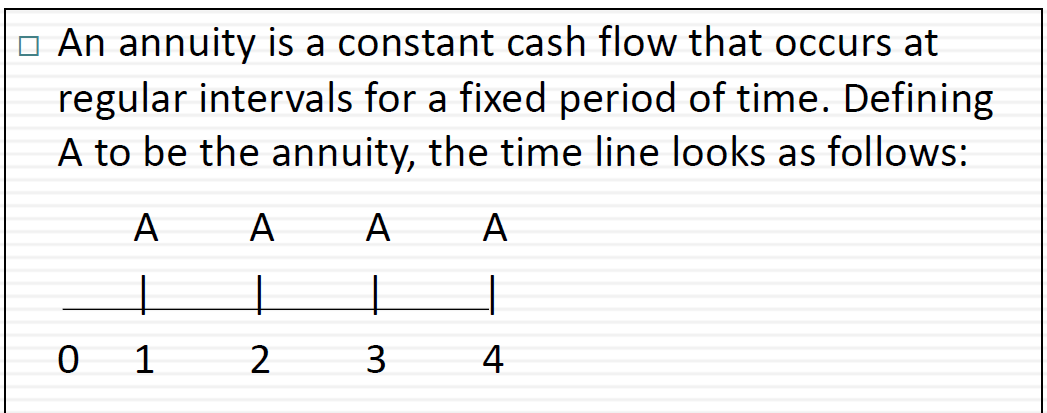
Annuity is the FV after every one year 🡪 lets say its fixed to 1000$

Then what’s your PV

For ex: every year you get 1000$ for next 5 years. total amount you received after 5 years 🡪 5000$

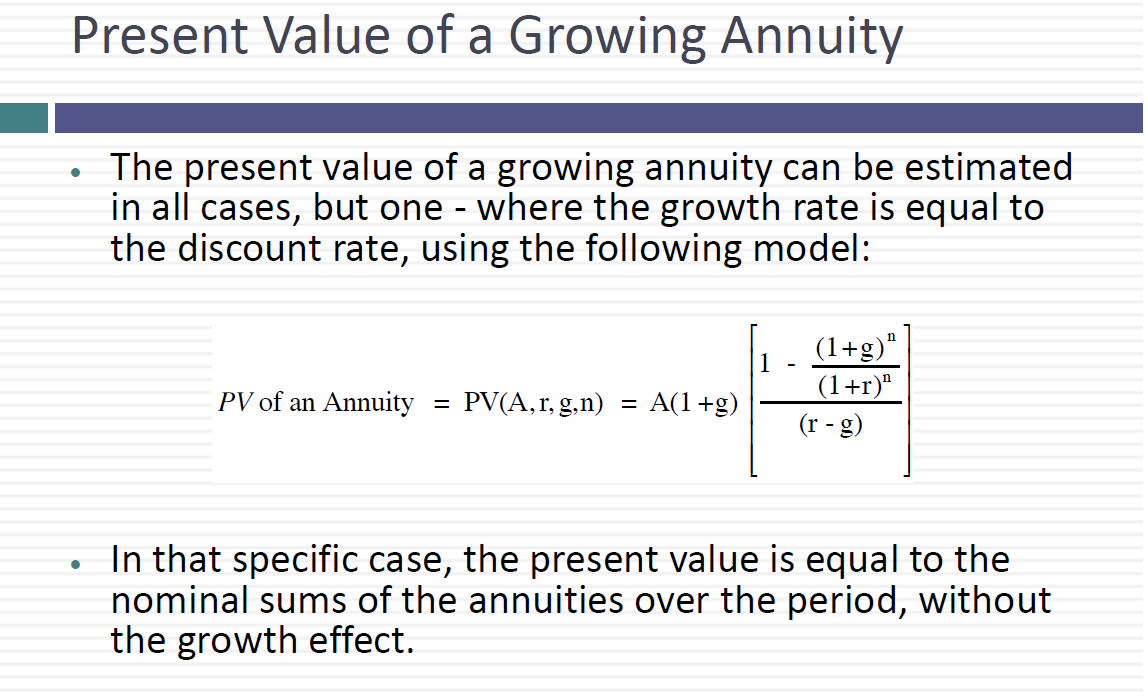
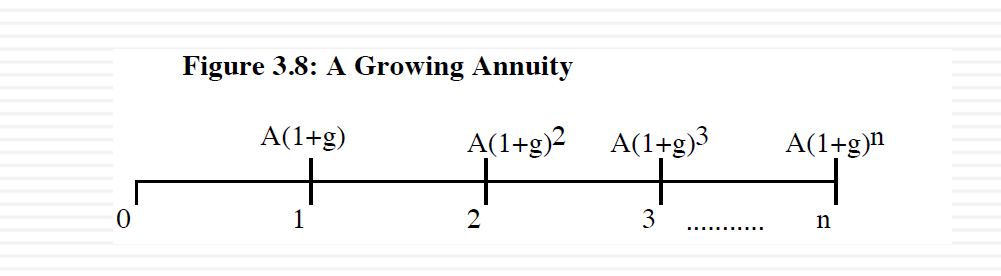
But whats the PV then for that 5000$?? It is 3790 $ . meaning , the 5000$ compounded after 5 years is equivalent to 3790 $ today

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Fv** | **Annual cashflow** | **Rate** | **number of years** | **(1+r)** | **(1+r)^n** | **1/(1+r)^n** | **1 - 1/(1+r)^n** | **(1 - 1/(1+r)^n)/r** | **CashFlow \* ((1 - 1/(1+r)^n)/r) --> PV** |
| 5000 | 1000 | 0.1 | 5 | 1.1 | 1.61051 | 0.62092132 | 0.379078677 | 3.790786769 | 3790.786769 |



## **Growing annuity**

Cash flow growing at a constant rate . g is the growth rate



## **Perpetuity**

Contant cashflow for eternity.

PV = A / R

## **Growing perpetuity**

Growing perpetuity for the eternity , at a constant growth rate (g)

PV of growing perpetuity = CF /(r-g)

CF = expected cash flow next year

# **Session 7 - Valuing a bond**

Bond is a contractual claim 🡪 what it means??

When you sign the contract (agreement between 2 parties) , you are told what would be your cashflows over the period of that contract.

Here cashflows can be fixed ( ex: 10 mm a year) or they can be adjustable ( based on some index or value , ex: 1% higher than inflation rate every year)

## **Effect of Default**

In any agreement there is a chance of defaulting ..ie person is unable to provide you consistent payments.

However there are few contracts where there is no default risk ( ex: 🡪 government bonds , why cos govt has the power to print money , so whenever govt has less money , they will increase the money in economy to pay the contractual money) . again remember here , not all governments are default free( ex: Pakistan where they have huge debt or where country is in war ( some economic condition) , or Venezuelan govt , Greek govt , Zimbabwe govt.. )

## **Fixed Rate , risk free bond**

How do we price the bond( current price) with fixed rate

Ex: 1000$ bond ( face value)

3% coupon 🡪 30$ per year ( fixed)

Time period = 10 year

US risk free rate 🡪 2%

Price of bond 🡪 (CF1 + CF2 + CF3 ….CF30) + ( Face value /(1 + r)^n) 🡪 simple formula 🡪

Price = Annuity ( (1- (1/1+r)^n) / r) + last cash flow at 10year

Here annuity is 30$ which is fixed

30 \* ((1 – (1/1.02)^10) / 0.02) + 1000/(1.02)^10

269.477 + 820.348 = 1089.8253

Since present value > Face value , this bond is trading at above par 🡪 trading at premium

Observation 🡪 market interest rate is higher 🡪 price of bond is lower

## **Yield to maturity and yield on a bond**

What is ROI 🡪 return on investment ( money that’s generated by the investment since the start of the investment)

IRR 🡪 internal rate of return 🡪 similar to ROI or NPV but its tells the annual rate of return on investment

So we can find the IRR , if we know the price , coupon , tenor ( time to maturity)

So , again above formula ,

**Price of bond 🡪 (CF1 + CF2 + CF3 ….CF30) + ( Face value /(1 + r)^n) 🡪 simple formula 🡪**

**Price = Annuity ( (1- (1/1+r)^n) / r) + last cash flow at 10year**

Price = 1043.76

Rate = ??

Coupon = 30

Time = 10 year (n)

1043.76 = 30\*PV (A,10, r) + 1000/(1+r) ^n 🡪 YTM 🡪 2.50%

Whereas bond yield is similar = coupon / price of bond = 30 / 1043.76 = 2.87%

YTM is more precise than bond yield

## **Bond convexity**

Asymmetric response of bond price change to interest rate changes in market is called convexity

For ex: same bond as above , 10 year , 3% coupon , valued at 1043.76 ( price) ,

So we calculated the yield as 2.5% , this is nothing but interest rate provided by govt.

**Case 1 ( rate increases , price decreases)**

2.5% 🡪 3.5%

Then price of bond will reduce by 🡪 8.18% (958.41)

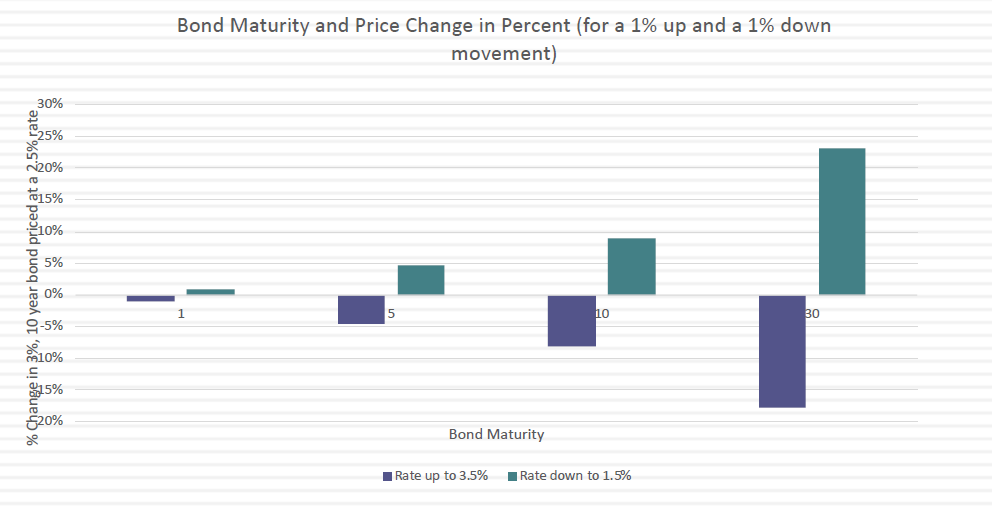
**Case 2 ( rate decreases , price increases)**

Similarly, if 2.5% 🡪 1.5%

Price will increase to 🡪 1138.33 (increase by 9.06%)

**Propositions on bond convexity**

**Maturity based effect**

* Longer the maturity of the bond , more sensitive it becomes to changes in market rates
  + 
* But the question is why long term bonds get affected more for variation in interest rates??
  + That’s cos , long term 🡪 so many years are pending 🡪 if any change now then whatever affect it does in this year , its going to continue and affect for coming years ( ripple effect)
  + For small term bonds, this will be less cos , no. of years( tenor is small)

**Coupon Rate based affect**

Higher the coupon, lower the effect of IR changes on bond.

## **Default Risk**

When the borrower is unable to pay coupon at the promised time ( ex: every year) then your cash flows will reduce . This is a risk called as default risk or credit risk

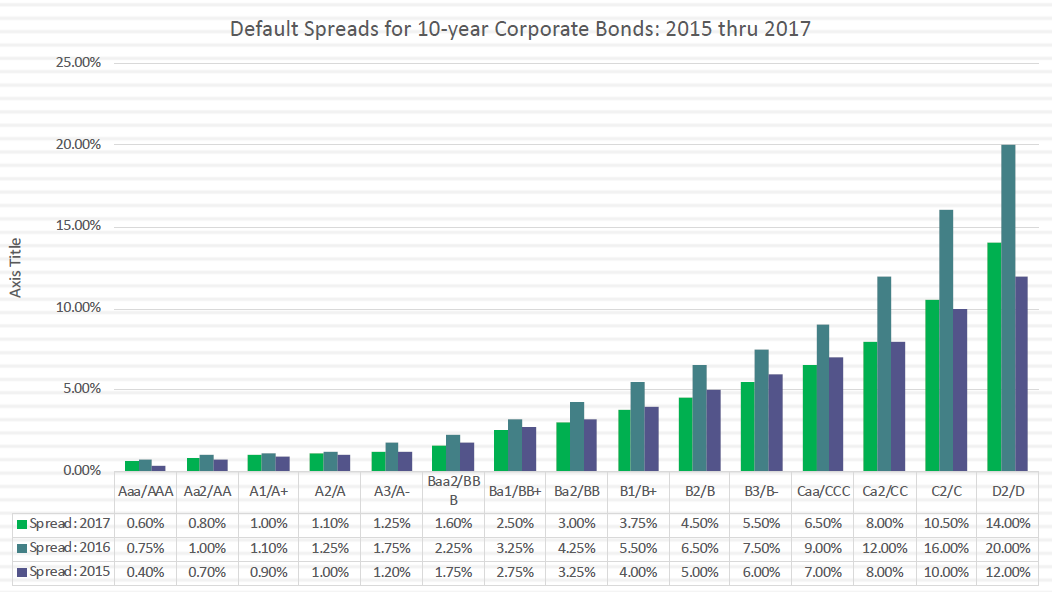
Now how do we compensate this risk?? Lender charge a higher rate of interest on the money that’s lend (cos even if the borrower unable to pay a portion of it , it should cover most of it)

This addition amount of money charged ( with higher rate of interest is called default spread)

* Default risk adjusted rate = Risk Free Rate + **default Spread**

Now there are rating agencies that rate the bonds ( S n P , moody’s)

The better the quality of the bond 🡪 higher is the rating 🡪 smaller the spread and lower the default risk.



## **Pricing bond with default risk**

Its the same formula as without default risk ( only difference is we need to include the default risk added to risk free rate in the formula ) to calculate the price

Ex: BBB bond with

Coupon 🡪 3%

Time 🡪 10 yr

Risk free rate 🡪 2.5

Default risk 🡪 1.75

Total rate 🡪 4.25

Face value 🡪 1000$

Price = CF1 + CF2 + CF3 … 1000/4.25 🡪 899.87$

## **Changing default Risk (effect on price of the bond due to change in default risk rate (quality of the bond))**

1. Rate = risk free rate ( market rate) + default risk rate( based on the bond)
   1. If the default risk rate increases🡪 due to company not performing good 🡪 leads to higher default risk rate🡪 increase in total rate of the bond
   2. Higher the rate , lower the price
      1. Why price is low or decreases 🡪 cos to maintain the same supply of the bond to customers , company will reduce the price ..due to which it will maintain its demand of the bond in market or may increase as well
      2. Yield = cashflow / price
      3. Since cashflow is same , and price increases
         1. Hence the yield increases
         2. Ppl think its good quality since yield is high , but that’s cos price is low ( but quality is also low and defaulting probability is also high for these bonds)
2. Bond rating
   1. Bond < BBB are not investment grade bond
   2. Ppl should not invest in low quality bond
      1. Low quality bond 🡪 high yield of such bonds

# **Session-8-Equity Valuation**

Equity is nothing but residual cashflow.

Equity also represents how much you own a company. More shares | stocks you own for that company , higher equity value for you.

Ie. Money left after giving to all shareholders. there are 2 ways to value an equity:

1. Amount of money spent in resources (capital investment) – revenue generated using those resources.
2. Same as above, but then we do this at firm level.

## **Valuing based on dividend ( DDM 🡪 dividend discount model)**

You value the equity based on the dividend ( money per share given to shareholders)

Ex: dividend = 4$ / share

Growth rate = 2%

Cost of equity for firm = 8% ( rate of interest)

Value of equity per share = 4 \* (1+ growth rate)/( Rate of interest – growth rate) 🡪 4 \* (1.02)/(0.08 – 0.02) 🡪 68$

If stock is trading at 70$ per share , then we can say its little overpriced.

## **FCFE ( Free Cash Flow to Equity Model)**

Here we value the equity based on the net cash flow after all debt payment , reinvestments … are done. This is on an assumption that value per share is not the exact amount ( ie. Company is holding back cash)

Here cashflow / per share = 4.25$ ( rest remains same as above)

Value of equity 🡪 4.25$ (1.02)/(0.08 – 0.02) = 72.25$

## **Cash flow to the firm**

Broader view point where we look at the cashflows not from equity investors point of view but at the total cash flows generated by the assets ( both for lender and investor)

This cashflow is before debt payments but after operating expenses and taxes 🡪 cashflow to firm