MGT201
Formulas Chapter 1-22

$$PVIF = \frac{1 - (1+i)^{-n}}{i} = (1-(1+i)^{-n})/i$$ *(to use in Excel worksheet)*

$$FVIF = \frac{(1+i)^{n} - 1}{i} = (1+i)^{(n)} - 1)/i$$

FV = PV*(1+i)^n
PV = FV/(1+i)^n
i = (Future Payment/Present Value)^$^{1/n}$ - 1

1. Fundamental Accounting Equation and Double Entry Principle.

- *Assets +Expense = Liabilities + Shareholders' Equity + Revenue*

Liabilities = Equity = Net Worth

Revenue – Expense = Income

1. ***Statement of Retained Earnings or Shareholders' Equity Statement***

Total Equity = Common Par Stock Issued + Paid In Capital + Retained Earnings

1. ***Current Ratio****:*

= Current Assets / Current Liabilities

1. ***Quick/Acid Test ratio****:*

= (Current Assets – Inventory) / Current Liabilities

1. ***Average Collection Period**:*

= Average Accounts Receivable /(Annual Sales/360)

1. PROFITABILITY RATIOS:

Profit Margin (on sales):
= [Net Income / Sales] X 100
Return on Assets:
= [Net Income / Total Assets] X 100
Return on equity:
= [Net Income/Common Equity]

6. ASSET MANAGEMENT RATIOS

***Inventory Turnover**:*
= Sales / inventories
Total Assets Turnover:
= Sales / Total Assets

1. ***DEBT (OR CAPITAL STRUCTURE) RATIOS:***
2. ***http://groups.google.com/group/vuZs***

Debt-Assets:
= Total Debt / Total Assets
***Debt-Equity**:*
= Total Debt / Total Equity
Times-Interest-Earned:
= EBIT / Interest Charges

1. ***Market Value Ratios:***

Price Earning Ratio:
*= Market Price per share / *Earnings per share*
Market /Book Ratio:
= Market Price per share / Book Value per share
****Earning Per Share (EPS):***
= Net Income / Average Number of Common Shares Outstanding

1. ***M.V.A (Market Value Added):***

MVA (Rupees) = Market Value of Equity – Book Value of Equity Capital

1. ***E.V.A (Economic Value Added):***

EVA (Rupees) = EBIT (or Operating Profit) – Cost of Total Capital

1. ***Interest Theory:***

- ***Economic Theory:***

i = iRF + g + DR + MR + LP + SR
– i is the nominal interest rate generally quoted in papers. The "real" interest rate = i – g
Here i = market interest rate
g = rate of inflation
DR = Default risk premium
MR = Maturity risk premium
LP = Liquidity preference
SR = Sovereign Risk
The explanation of these determinants of interest rates is given as under:

1. ***Market Segmentation:***

- ***Simple Interest (or Straight Line):***

F V = PV + (PV x i x n)

- ***Discrete Compound Interest:***

Annual (yearly) compounding:
F V = PV x (1 + i) n

Monthly compounding:

F V = PV x (1 + (i / m) m x n

- ***Continuous (or Exponential) Compound Interest:***
- *F V (Continuous compounding) = PV x e* ***i x n***

1. ***Estimated current assets for the next year***

= [Current assets for the current year/Current sales] x Estimated sales for the next year

1. ***Expected Estimated retained earnings***

= estimated sales x profit margin x plowback ratio

1. ***Estimated discretionary financing***

= estimated total assets – estimated total liabilities –estimated total equity

1. ***G (Desired Growth Rate)***

= return on equity x (1- pay out ratio)

CASH FLOW STATEMENT

Net Income
Add Depreciation Expense
http://groups.google.com/group/vuZs
Subtract Increase in Current Assets:
Increase in Cash
Increase in Inventory

Add Increase in Current Liabilities:
Increase in A/c Payable

Cash Flow from Operations
Cash Flow from Investments
Cash Flow from Financing
Net Cash Flow from All Activities

1. *Interest Rates for Discounting Calculations*

- *Nominal (or APR) Interest Rate = i nom*
- *Periodic Interest Rate = i per*

It is defined as
iper = (i nominal Interest rate) / m
Where
m = no. of times compounding takes place in 1 year i.e.
If semi-annual compounding then m = 2

- *Effective Interest Rate = i eff*

*i eff = [1 + (i nom / m)]**m** – 1*

1. ***Calculating the NPV of the Café Business for 1st Year:***

NPV = Net Present Value (taking Investment outflows into account)
NPV = –Initial Investment + Sum of Net Cash Flows from Each Future Year.
*NPV = – I**o** +PV (CF**1**) + PV (CF**2**) + PV (CF**3**) + PV (CF**4**) + ...+ ∞*

1. ***Annual Compounding (at end of every year):***

***FV** = CCF (1 + i) **n** – 1*
Annual Compounding (at end of every year)
PV =FV / (1 + i) n . n = life of Annuity in number of years

1. ***Multiple Compounding:***

*Future Value of annuity =**CCF (constant cash flow)*(1+ (i/m) m*n-1/i/n***
Multiple Compounding:
PV** =FV / [1 + (i/m)] **mxn

1. ***Future value of perpetuity:***

=constant cash flow/interest rate

1. ***Future value by using annuity formula***

*FV =CCF [(1+i) **n** - 1]/ i*

1. ***Return on Investments:***

ROI= (ΣCF/n)/ IO

1. ***Net Present Value (NPV):***

NPV= -IO+ΣCFt/ (1+i) t
Detail
NPV = -Io + CFt / (1+i)t = -Io + CF1/(1+i) + CF2/(1+i) ^2 + CF` / (1+i)^3 +..

-IO= Initial cash outflow
i=discount /interest rate
t=year in which the cash flow takes place

1. ***Probability Index:***

PI = [Σ CFt / (1+ i) t]/ IO

1. ***Internal Rate Of Return(IRR) Equation:***

NPV= -IO +CF1/ (1+IRR) + CF2/ (1+IRR) ^2.....

1. ***Internal Rate of Return or IRR:***

The formula is similar to NPV
NPV = 0 = -Io + CFt / (1+IRR)t = -Io + CF1/(1+IRR) + CF2/(1+IRR) ^2 + ..

1. ***Modified IRR (MIRR):***

$$(1+MIRR)^n = \frac{\text{Future Value of All Cash Inflows….}}{\text{Present Value of All Cash Outflows}}$$

$$(1+MIRR)^n = \frac{CF_{in} * (1+k)^{n-t}}{CF_{out} / (1+k)^t}$$

1. ***Equivalent Annual Annuity Approach:***

EAA FACTOR = *(1+ i)^* ***n*** */ [(1+i)^* ***n -1****]*
Where n = life of project & i=discount rate

BONDS' VALUATION

The relationship between present value and net present value

1. ***NPV = -Io + PV***

1. ***Present Value formula for the bond:***

$$PV = \sum_{t=1}^{n} CFt / (1+rD)t = CF1/(1+rD) + CFn/(1+rD)2 + ..+ CFn/(1+rD)n + PAR/(1+rD)^n$$

In this formula
PV *= Intrinsic Value of Bond or Fair Price (in rupees) paid to invest in the bond. It is the Expected or Theoretical Price and NOT the actual Market Price.*
rD *= it is very important term which you should understand it care fully. It is Bondholder's (or*
Investor's) Required Rate of Return for investing in Bond (Debt).As conservative you can choose
minimum interest rate. It is derived from Macroeconomic or Market Interest Rate. Different from the Coupon Rate!

Recall Macroeconomic or Market Interest Theory: i = iRF + g + DR + MR + LP + SR
CF *= cash flow = Coupon Receipt Value (in Rupees) = Coupon Interest Rate x Par Value. Represents cash receipts (or in-flow) for Bondholder (Investor). Often times an ANNUITY pattern Coupon Rate derived from Macroeconomic or Market Interest Rate. The Future Cash Flows from a bond are simply the regular Coupon Receipt cash in-flows over the life of the Bond. But, at Maturity Date there are 2 Cash In-flows: (1) the Coupon Receipt and (2) the Recovered Par or Face Value (or Principal)*

n *= Maturity or Life of Bond (in years)*
In the next lectures, you would study that how the required rate of return is related to market rate of return

1. ***Calculate the PV of Coupons from the FV Formula for Annuities (with multiple compounding within 1 year):***

FV = CCF (1 + rD/m)nxm - 1/rD/m
http://groups.google.com/group/vuZs
Use Monthly Basis for this example. n = 1 year m = 12 months
CCF = Constant Cash Flow = Rs 1,000 = Monthly Coupon
rD = Annual Nominal Required Rate of Return for investment in Bond (Debt) = 10% pa.
Periodic Monthly Required Rate of Return is rD/m = 10/12 = 0.833 % = 0.00833 p.m.
m = 12 months

1. ***YTM =Total or Overall Yield:***

= Interest Yield + Capital Gains Yield

1. ***Interest Yield or Current Yield:***

= Coupon / Market Price

1. ***Capital Gains Yield:***

= YTM - Interest Yield

1. ***FV=CCF[(1+rD/m)n*m-1]/rD/m***

N=1 year ,m= no. of intervals in a year =12
CCF=constant cash flow
n *= Maturity or Life of Bond (in years)*

1. ***Call****:*

=par value +I, year copoun receipts

Another thing to keep in mind is that YTM has two components first is

1. ***YTM:***

=interest yield on bond +capital gain yield on bond

1. INTEREST YIELD =annual copoun interest /market price
2. CAPITAL YIELD =YTM –INTEREST YIELD

1. ***Perpetual Investment in Preferred Stock***

– PV = DIV 1 / r PE

1. ***Perpetual Investment in Common Stock:***

*PV = DIV1/(1+r**CE**) +DIV2/(1+r**CE**)**2** +…..+ DIVn/(1+r**CE**)**n** + **Pn/ (1+rCE)n***
PV = Po = Expected or Fair Price = Present Value of Share, DIV1= Forecasted Future Dividend at end of Year 1, DIV 2 = Expected Future Dividend at end of Year 2, …, Pn = Expected Future Selling Price, rCE = Minimum Required Rate of Return for Investment in the Common Stock for you (the investor). Note that Dividends are uncertain and n = infinity*

1. ***PV (Share Price) = Dividend Value + Capital Gain.***

Dividend Value is derived from Dividend Cash Stream and Capital Gain / Loss from Difference
between Buying & Selling Price.

1. ***Simplified Formula*** *(Pn term removed from the equation for large investment durations i.e. n =*

infinity):
*PV = DIV1/ (1+r**E**) + DIV2/ (1+r**E**)* ***2*** *+ … DIVn/(1+r**E**)**n***
*= **DIVt / (1+ rE) t.** t = year. Sum from t =1 to n*

1. ***Fair Value. Dynamic Equilibrium.***

*If **Market Price > Fair Value** then Stock is Over Valued*
Share Price Valuation -Perpetual Investment in Common Stock:

1. ***Zero Growth Dividends Model:***

DIV1 = DIV 2 = DIV3

1. ***The Formula for common stock***

PV = Po= DIV1 / (1+ r**CE**) + DIV1 / (1+ r**CE**) 2 + DIV1 / (1+ r**CE**) 3 + ...*
+...
*= **DIV 1 / rCE***

1. ***Dividends Cash Flow Stream*** *grows according to the Discrete Compound Growth Formula*

DIVt+1 = DIVt x (1 + g) t.
t = time in years.

1. ***Zero Growth Model Pricing***

PV = Po = DIV1 / r**CE***

1. ***Constant Growth Model Pricing***

PV = Po = DIV1 / (r**CE** -g)*
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1. ***Dividends Pricing Models:***

***Zero Growth**: Po*=DIV1 / r**CE** (Po* is being estimated)*

1. ***rCE*= DIV1 / Po (rCE* is being estimated)***

Similarly,

1. ***Constant Growth:** Po*= DI V1/ (r**CE** -g)*

rCE*= (DIV 1 / Po) + g

use this formula to calculate the required rate of return.

1. ***Gordon's Formula:***

rCE= (DIV 1 / Po) + g*

In this the first part
(DIV 1 / Po) is the dividend yield
g is the Capital gain yield.

1. ***Earning per Share (EPS) Approach:***

PV = Po* = EPS 1 / rCE + PVGO
***Po** = Estimated Present Fair Price,*
***EPS 1** = Forecasted Earnings per Share in the next year (i.e. Year 1),*
*r**CE** = Required Rate of Return on Investment in Common Stock Equity.*
***PVGO** = Present Value of Growth Opportunities. It means the Present Value of Potential*

Growth in Business from Reinvestments in New Positive NPV Projects and Investments PVGO is perpetuity formula.
The formula is
PVGO = NPV 1 / (rCE - g) = [-Io + (C/rCE)] / (rCE -g)
*In this PVGO Model: Constant Growth "g". It is the growth in NPV of new Reinvestment Projects (or Investment).**g= plowback x ROE***
Perpetual Net Cash Flows (C) from each Project (or reinvestment).
Io = Value of Reinvestment (Not paid to share holders)
= Pb x EPS
Where Pb= Plough back = 1 – Payout ratio
Payout ration = (DIV/EPS) and

1. ***EPS Earnings per Share**= (NI - DIV) / # Shares of Common Stock Outstanding*

Where NI = Net Income from P/L Statement and DIV = Dividend, RE1= REo+ NI1+ DIV1
ROE = Net income /# Shares of Common Stock Outstanding.

1. ***NPV 1 = [-Io + (C/rCE)] / (rCE -g)***

If we compare it with the traditional NPV formula
-Io = Value of initial investment
(C/rCE) = present value formula for perpetuities where you assume that you are generating the net cash
inflow of C every year.
***C = Forecasted Net Cash Inflow from Reinvestment** = Io x ROE*
Where ROE = Return on Equity = NI / Book Equity of Common Stock Outstanding

1. ***Range of Possible Outcomes, Expected Return:***

Overall Return on Stock = Dividend Yield + Capital Gains Yield (Gordon's Formula)

1. ***Expected ROR = < r > = pi ri***

Where pi represents the Probability of Outcome "i" taking place and ri represents the Rate of Return (ROR) if Outcome "i" takes place. The Probability gives weight age to the return. The Expected or Most Likely ROR is the SUM of the weighted returns for ALL possible Outcomes.

1. ***Stand Alone Risk of Single Stock Investment:***

Risk = Std Dev = (r i - < r i >)2 p i . = Summed over each possible outcome " i " with return "r i " and probability of occurrence "p i ." < r I > is the Expected (or weighted average) Return

1. ***Possible Outcomes Example Continued:***

Measuring Stand Alone Risk for Single Stock Investment
Std Dev = δ = √ Σ (r i - < r i >) 2 p i.

1. ***Coefficient of Variation (CV):***

= Standard Deviation / Expected Return.
CV = σ/ < r >.
< r > = Exp or Weighted Avg ROR = pi ri

1. ***Risk Basics***

Risk = Std Dev = σ = √ (r i - < r i >)2 p i . = "Sigma"

1. ***Types of Risks for a Stock:***

Types of Stock-related Risks which cause Uncertainty in future possible Returns & Cash Flows:
Total Stock Risk = Diversifiable Risk + Market Risk
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1. ***Portfolio Rate of Return***

Portfolio Expected ROR Formula:
$rP^* = r1\ x1 + r2\ x2 + r3\ x3 + \ldots + rn\ xn$.

1. ***Stock (Investment) Portfolio Risk Formula:***

$p = \sqrt{}\ XA2\ \sigma A\ 2 + XB2\ \sigma B\ 2 + 2\ (XA\ XB\ \sigma A\ \sigma B\ AB)$

1. ***Efficient Portfolios****:*

$rP^* = xA\ rA + xB\ rB + xC\ rC$