① $P+(n \cdot P \cdot k)$ Simple Interest

② $P(1+k)^n$ Compound Interest

Total Dollar Capital Gain: how much your share value changed

Total Dollar Return: how much your share value rises ⊕ Dividends earned * How much you earned total

Securities: Pieces of paper with Dollar Value

③ $PV = P(1+k)^{-n}$ Present Value (Discounting)

④ $PV = R\left(\frac{1-(1+r)^{-n}}{r}\right)$ [Ordinary Annuity]

⑤ $FV = R\left(\frac{(1+r)^n - 1}{r}\right)$ [Ordinary Annuity]

⑥ $PV = \frac{C}{K}$ [ordinary Perpetuity / Preferred Shares Calc] $P_{ps} = \frac{D_p}{k_p}$

⑦ $PV = \frac{C}{k-g}$ [Growing Perpetuity] $\frac{PMT_0(1+g)}{k-g}$ "or" $\frac{PMT_1}{k-g}$

⑧ $PV = \frac{C}{k-g}\left(1-\left(\frac{1+g}{1+k}\right)^n\right)$ [Growing Annuity]

⑨ $k^{eff} = (1+\frac{k}{n})^n - 1$ [effective Rate]

$k^{eff} = e^k - 1$ [Continuous Compounding]

⑩ $(1+i)^{1/2} = (1+r)^2$ $i = (1+r)^{\frac{1}{2}} - 1$ [MORTGAGES]

⑪ "Risk Free Rate of Return" $k = RF + \text{Risk Premium}$ [Equity securities]

⑫ $P_0 = \frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \dots\dots \frac{D_n + P_n}{(1+k)^n}$ [DDM Model]

P_n = expected Share Price in "n" years; P_0 = share Price today; n = holding Period

⑬ $P_0 = \frac{D_0(1+g)}{k-g} = \frac{D_1}{k-g}$ [Constant Growth Model] *note $k = \frac{D_1}{P_0} + g$

⑭ $P_0 = \frac{D_1}{(k+1)^1} + \frac{D_2}{(k+1)^2} + \dots\dots \frac{D_n + P_n}{(k+1)^n}$ [Multiple Stage Growth]

*note $P_n = \frac{D_{n+1}}{k-g}$

⑮ $k_{nominal} = k_{real} \cdot k_{inflation}$

⑯ $B = V(1+i)^{-n} + rV\text{an}\overline{n}|i$ [Bond Price]

r = Coupon rate; i = yield rate; V = face value

⑰ $\frac{CF_1}{P_0}$ [Income Yield] CF_1 = expected cash flows; P_0 = Purchase Price (Beginning market Price)

⑱ $\frac{P_1 - P_0}{P_0}$ [Capital Gain (loss) return] * Dividends not included

⑲ $\frac{CF_1 + P_1 - P_0}{P_0}$ [Total Return] Total return = income yield + Capital gain * Includes Dividends

⑳ $E_r = (r_1 \cdot prob_1) + (r_2 \cdot prob_2) + \dots\dots (r_n \cdot prob_n)$ [Expected Return]

* prob in decimals * return in percentage

㉑ [Standard Deviation]

Ex Post: $\sqrt{\frac{(r_1 - r_{avg})^2 + (r_2 - r_{avg})^2 + \dots (r_n - r_{avg})^2}{n-1}}$ *Variance is term inside the root

Ex Ante: $\sqrt{prob_1 \cdot (r_1 - E_r)^2 + prob_2 \cdot (r_2 - E_r)^2 + \dots prob_n \cdot (r_n - E_r)^2}$

㉒ $ER_p = W_a \cdot ER_A + W_B \cdot ER_B + \dots W_n \cdot ER_n$ [Expected Return Portfolio]

* W_a = weight of stock A

* ER_A = Expected Return of stock A

$COV_{AB} = prob_1 \cdot (r_{A_1} \cdot \overline{r_A})(r_{B_1} \cdot \overline{r_B}) + prob_2 (r_{A_2} \cdot \overline{r_A})(r_{B_2} \cdot \overline{r_B}) \dots\dots$ [Covariance]

㉓

Bond (Debt):
- Supplies Capital
- Claim on Cash Flows
- Fixed (contractual) cash flow
- senior claim

Valued by:
- Credit Risk
- Interest Rate
- Liquidity

Stock (Equity):
- Supplies capital
- Claim on cash Flow
- Discretionary Cash Flow
- Residual Claim
- Voting Rights

Valued By:
- Future Cash Flows

Real Assets (Tangible): ie: Machinery, buildings

Financial Intermediary: (Indirect), change nature of transaction

Market Intermediary: (Direct), doesn't change the nature of transaction ie: help facilitate, (Brokers)

Intermediaries:
- Chartered Banks
- Insurance Comp's
- Pension Funds
- Mutual Funds (Pass Through)

Financial Instruments:
- Debt Instrument (Bank Loan, Commercial Papers, T-Bills, loans, bonds, debenture)
- Equity Instrument (Common / Preffered Shares)

Money Market Securities: (Short term)

Capital Market Security: (Longer than a year)

Market Capitalization: (Total Market) Value

Secondary Market:
- Existing securities are Traded

Primary Market:
- newly issued shares
- New Securities

NPV (Net present value) = Projected Value − Projected Costs

Free Cash Flows: (Project Inflow − Project Outflow = Rev)

Revenue − Expenses (not Depreciation) − CapX − taxes

Fixed vs. Variable rate (Nominal vs. Real)

AAA, AA, A, BBB, BB, B, CCC

Speculative Bonds: (High Yield Bonds) "or" (Junk Bonds) bonds with ratings below investment grade

T-Bill (Promissory note): written promise to pay back a loan

CF_0 (Initial after tax outflow): required investment to initiate a project

Inflate:
- Advertising
- Overhead
- COGS
- Sales

Don't inflate:
- Depreciation
- Lease
- Fixed (Pre-determined) Contracts

r_n = nominal Interest rate; r_r = Real Rate; i = expected inflation; $r_n = (1+r_r)\cdot(1+i) - 1$

Marginal / Incremental Cash Flows: additional cash flows that result from Capital Budgeting decisions generated by new products

Return = $\frac{\text{Payoff}}{\text{investment}} - 1$

when discount rate = return, NPV = 0

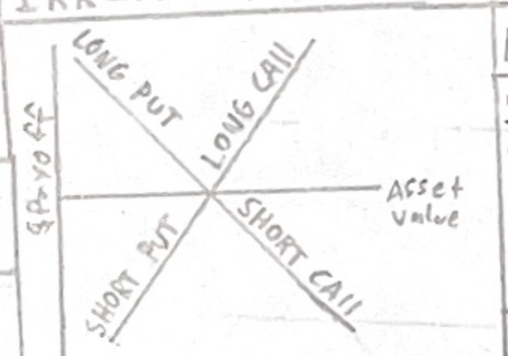
IRR > k = Good NPV

IRR < k = BAD NPV

Coupon < Yield = Discount; Coupon > Yield = Premium; Coupon = Yield = Zero coupon Bond

Ex Ante: before the fact (expected returns)

Ex Post: after the fact (Historical returns)



Less correlated = low standard Deviation

Unsystematic Risk: can be reduced by diversification

Systematic Risk: affects everybody (Market Risk) ie: inflation, interest rates

↑ Portfolio Size = ↓ Risk

Call: buyer has right to purchase

Put: buyer has right to sell

Short = Seller; Long = Buyer

$IV(call) = (S-x)$ [Intrinsic Value]

TV = option premium − IV

$IV(Put) = (x-S)$

Market Value = Option Premium

S = asset Price

X = Strike Price

	Call	Put
↑ Asset Price	↑	↓
↑ Exercise Price	↓	↑
↑ expiration date	↑	↑
↑ volatility (risk)	↑	↑
↑ interest rates	↑	↓
↑ Dividends	↓	↑

$k = k_d(1-T)$ [after-tax cost debt]

k_d = before tax cost of debt; T = corporate tax rate

Bond Current Yield: $CY = \frac{\text{annual interest}}{\$B}$ annual coupon interest divided by current market price

Longer Term bonds with lower coupon rates and lower market yields possess greater **Interest Rate Risk** than Short-Term higher coupon bonds with higher yields

Duration: measures bond price % change when the market interest rate changes

Correlation > 0, Move Together

Correlation = 0, No correlation

Correlation < 0, Move opposite

㉔ $\sigma_P = \sqrt{(W_A)^2(\sigma_A)^2 + (W_B)^2(\sigma_B)^2 + 2(W_A)(W_B)(COV_{AB})}$ [Portfolio Standard Deviation]

$P_{AB} = \frac{COV_{AB}}{\sigma_A \cdot \sigma_B}$ [Correlation Coefficient]

Figure 8-4:		
Probability:	Stock A Er:	Stock B Er:
0.1	60%	5%
0.2	20%	25%
0.5	10%	6%
0.2	-25%	0%

ex: using 8-4, Calculate Er for each stock (20)

$ER_A = 0.1(60) + 0.2(20) + 0.5(10) + 0.2(-25) = 10\%$

$ER_B = 0.1(5) + 0.2(25) + 0.5(5) + 0.2(0) = 8\%$

ex: using 8-4, Calculate Standard deviation of stocks A/B (21) *Ante

$\sigma_A = \sqrt{0.1(60-10)^2 + 0.2(20-10)^2 + 0.5(10-10)^2 + 0.2(-25-10)^2} = 22.69\%$

$\sigma_B = \sqrt{0.1(5-8)^2 + 0.2(25-8)^2 + 0.5(5-8)^2 + 0.2(0-8)^2} = 8.72\%$

∴ Stock A is Riskier

ex: using 8-4, estimate Er for a Portfolio that has $600 in stock A and $1400 in stock B (22)

Portfolio value = $600 + $1400 = $2000

$W_A = \frac{600}{2000} = 0.3$, $W_B = \frac{1400}{2000} = 0.7$

$ER_P = 0.3(10\%) + 0.7(9\%) = 8.6\%$

*notice in between 9 and 10%

ex: using 8-4, estimate the covariance for stocks A and B (23)

$COV_{AB} = 0.1(60-10)(5-8) + 0.2(20-10)(25-8) + 0.5(10-10)(5-8) + 0.2(-25-10)(0-8) = 75\%$

ex: using the covariance estimate above, determine the standard deviation of a Portfolio with 30% in Stock A and 70% in Stock B (24)

$\sigma_P = \sqrt{(0.3)^2(22.69)^2 + (0.7)^2(8.72)^2 + 2(0.3)(0.7)(75)} = 10.73\%$

Benefits of Investment Funds:

- Diversification
- Liquidity
- Cost Advantage
- Professional Managment

Costs of investing in mutual Funds:

- Management expense ratio (MER)
- Loads: Front end = pay % up front
  Back End = pay % when you take out
  ∴ Both end up in same place
  -Load costs not reported on net Returns

Mutual Fund Restrictions:

- Can't borrow
- Can't go short
- Can't hold more than 10% of comp
- Can't buy commodities
- Can't use derivatives except
  -hedge underlying risk
  -create synthetic securities

Hedge Funds (less regulated):

- min avg investment $1mil
- High fees
- long-term commitment

3 basic measures provide liquidity:

- Standing liquidity facility
- Emergency lending assistance
- Term purchase and resale agreements

CRA Basic Tests:

① Interest is compensation for the use or retention of money owed to another

② Interest must be referable to a Principal Sum

③ Interest accrues from day to day

promised yield: quoted interest rate if paid on time as promised

Bankers Acceptance: short term paper sold by an issuer to a bank, obligating the bank to pay off the debt instrument at maturity if the issuer defaults

Prime Lending Rate: interest rate banks use to calculate their other interest rates, also the standard cost of an operating line of credit

Floating Interest Rate: interest rate that changes regularly

Covenants: Promises or restrictions in a Contract

Call Prices: prices generally at a premium over par where issuers can re-purchase bond

Net Asset unit Value (NAV)

$NAV = \frac{\text{Market value of assets} - \text{Liabilities}}{\text{\# of shares outstanding}}$

What do Central Banks do?

- Print and distribute currency
- Conduct Monetary Policy
- Ensure Financial stability
- Fiscal Agent manages Govt. deposits

Fiat money = not Gold, problem is they can print unlimited of it. Not backed.

Seigniorage: profit made by govt issuing currency. Difference between face value and production costs

Money is Valuable as:

- means of exchange
- unit of measurement
- store of value

Monetary Policy is designed to:

- ensure low, stable inflation
- Maintain Purchasing Power

Bank of Canada targets inflation, not money supply

Bank of Canada targets **Overnight rate** (Policy rate), rate charged to other banks.

-Governing Council determines Bank Rate

ex: a comp is expected to pay a dividend of $1.00 at the end of this year, a $1.50 dividend at the end of yr 2 and a $2.00 dividend at the end of yr 3. It is estimated dividends will grow at a constant rate of 4% per year thereafter. Determine the market price of this companies common shares if the required rate of return is 11%

$D_1 = \$1.00$, $D_2 = \$1.50$, $D_3 = \$2.00$, $g = 0.04$, $k = 0.11$

$D_4 = \$2.00(1.04) = \$2.08$ (MSG)

$P_3 = \frac{2.08}{0.11-0.04} = \$29.71$ (14)

$P_0 = \frac{1.00}{1.11} + \frac{1.50}{(1.11)^2} + \frac{2.00+29.71}{(1.11)^3} = \$25.31$

	Closed-end	open-end	ETF
Where Traded	exchange (Real estate)	with mutual fund through brokers or direct	(exchange) • Better Liquidity • Low costs • Lower taxes
# Shares	Fixed	Changes Daily	Changes infrequently when accredited investors trades with fund
Price	P <> NAV	P = NAV	P ≈ NAV
Strategy	hold illiquid assets	many categories	many categories
$holdings	No need to hold cash	have to hold cash	doesn't cash out redemptions
Costs/Tax	Low, no forced tax	Forced tax	Low, no tax

ex: The present value of a dollar one year from now is 0.927644. The present value of a dollar 2 yrs from now is 0.854172. What is the price of a bond that pays an annual coupon of 7% and matures in 2 yrs. Find its YTM.

Bond Price = $70 \cdot 0.927644 + 1070 \cdot 0.854172 = 978.90$

n = 2, PMT = 70, PV = -978.90, FV = 1000

YTM = 8.19%

$PV = \sum_1^T \frac{C}{(1+y)^t} + \frac{P}{(1+y)^T}$

C = Coupon Payment, T = Maturity, P = Face Value, V = Market Price

ex: XYZ corporation raised capital in both the equity and debt markets. It has $3mil shares of common stock outstanding. It also has long term bonds outstanding valued at $20mil. Suppose xyz is expecting free cash flow next yr of $6mil, and this free cash flow is expected to remain $6mil per yr forever thereafter. The discount rate is 8%, what is xyz share price?

Total comp Value: $\frac{6mil}{.08} = 62.5mil$

Value of equity: 62.5mil - 20mil = 42.5mil

Share Price: $\frac{42.5mil}{3mil} = \$14.17$

Bullet Payment (Balloon pymt): principal payment made in one lump sum at maturity

Bond Indenture: Legal document that specifies payment requirements and info

Fiduciary: Third party who acts to ensure interests are upheld

Covenant provision: Clauses that lay out legal rights of bondholder

mortgage Bond: debt instruments secured by real assets

Debentures: Debt instrument similar to bonds but are generally unsecured

Callable Bond: bonds that give issuer option to call or repurchase outstanding bonds

Convertible Bonds: bonds that can be converted into common shares

Sinking Fund Provision: issuer set aside fund a yr

↓Interest rates = ↑Bond Price

∴ Longer the time to maturity, more sensitive bond is to change in market rates

Net Present Value:

$\frac{CF_1}{(1+k)^1} + \frac{CF_2}{(1+k)^2} + \ldots = CF_0$

Profitability Index:

$PI = \frac{PV(\text{cash inflows})}{PV(\text{cash outflows})}$

Sustainable Growth Rate:

$g = b \cdot ROE$,

ROE = NPM · Turnover ratio · Leverage ratio

ex: a comp just paid an annual DD of $2 per share and had an EPS of $4 per share. Its projection for net profit margin, turnover ratio, and leverage ratio are 4%, 1.25, and 1.4. Determine the firms sustainable growth rate,

$ROE = (0.04)(1.25)(1.4) = 0.07$

Payout ratio $= \frac{DPS}{EPS} = \frac{1}{4} = 0.25$, $b = 1 - 0.25 = 0.75$, $g = 0.75(0.07) = 5.25\%$

Holding Period Return = **Yield to Maturity** only if held to maturity

Market Price of preferred shares go up when interest rates decline.

The quoted price of a bond is the actual price paid when bond is sold on on the date of the coupon Payment

ex: determine the market price of a $50 par value preferred share that pays annual DD's based on a 4% DD rate when market rates are 5% (6)

$Dp = 50 \cdot .04 = \$2.00$

$Pps = \frac{2.00}{0.05} = \$40.00$

avg returns is simply weighted avg of all returns, Standard deviation goes down more as you add stocks

American: exercise anytime
European: only on expiration

Actively Managed Funds:

- Value Funds
- Growth Funds
- Size-Based Funds
- Sector Funds

Index Fund = Lower MER

Dividend yield:

$\frac{DPS}{P}$ Current DD per share / Current Share Price