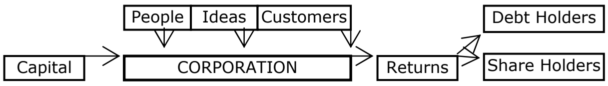
Finance Course Review

Introduction

Selecting Investments: return for risk, evaluate risk, value investment, allocation of scarce capital, tax consequences
Financing Decisions: source doesn't matter, incentive consequences, signals to investors, governance structure, risk mgmt



Capital Structure: Debt/Equity Split. Bankruptcy transfers control. Absolute priority to debt holders after failure
Debt and equity -> Ownership separated from control -> Manager's job to maximize shareholder wealth

Time value of money, discount factor, present value, yield curve (usually assumed to be flat)
Capital Markets: Trade debt/equity claims; Discount factors est.; Transfer wealth in time; Transfer exp. profits future -> today
Continuous Compounding: $DF = \frac{1}{(1+\frac{r}{freq})^{yrs \cdot freq}}$ Perpetuity: $PV = \frac{C}{r}$. Growing Perpetuity: $PV = \frac{C}{r-g}$ Annuity: $PV = C(\frac{1}{r} - \frac{1}{r(1+r)^t})$
DF = e^{-Rt}

Share valuation: NPV exp. future div., i.e. growing perpetuity: $P = \frac{DIV_1}{r-g}$ r is CoC_E. $r = \frac{DIV_1}{P_0} + g$ (div yield + div growth rate)
g = plowback ratio x ROE ROE = EPS / Book Equity/Share
Plowback ratio = 1 – payout ratio = 1 – DIV/EPS
Growth stock (PVGO sig.) vs. income stock. No plowback or growth: $r = \frac{DIV_1}{P_0} = \frac{EPS_1}{P_0}$ or $P_0 = \frac{EPS_1}{r}$ general: $P_0 = \frac{EPS_0}{r} + PVGO$

Valuing Safe Projects

NPV: Depreciation (tax), allocated overhead (not included in tax), wages (full time/other project), inflation
Working capital: Difference between short-term assets and liabilities. Cost at beginning, same amount retrieved at end
Choosing between investments: Divide by annuity factor for equivalent annual income; assumes long lifespan, no tech/price Δ
Alternatives: *Payback pd*: ignores afterwards, some not discounted; *IRR:* project value 0, many/none poss., hard to compare
Weak-form efficient markets: price changes random; impossible to make consistent profits based on price histories
Semi-strong form efficient markets: prices reflect new information quickly; can't make much money from publicly available data
Strong form efficient markets: even privileged information does not give an edge, allowing for costs to gather it

Capital Asset Pricing Model

Cost of Capital: return making investors indifferent to invest or not; at appropriate discount rate. NPV>0 means return>CoC
Expected return is probability weighted average return. Variance/std dev good measures of risk. Measure Volatility: Time period?
Mean-Variance Preferences: Exceptions (ethics, liquidity, distribution, non-standard asset).
Assumption for practical finance. Indifference curves -> rank investments, slope -> risk appetite (Joe and Camilla)
Portfolio Variance (Matrix, 2 stocks) $= x_1^2\sigma_1^2 + x_2^2\sigma_2^2 + 2x_1x_2\rho_{12}\sigma_1\sigma_2$ Diversification effect from negative correlation -> reduced risk
Share Beta: Sensitivity of share price to portfolio price; proportion of portfolio risk contributed by the share

$\beta_i = \frac{\sigma_{im}}{\sigma_m^2} = \frac{\rho_{im}\sigma_i}{\sigma_m}$ For two stocks (weighted beta): $\beta_1 = \frac{x_1^2\sigma_1^2 + x_1x_2\rho_{12}\sigma_1\sigma_2}{PortfolioVariance}$

If all held same portfolio, would be market portfolio; beta would be risk contribution of a share (efficient portfolio->CAPM).
Portfolio risk in mean–variance space: bows out, depending on ρ. Short stock w/ lower return to buy one w/ higher return, risk increases.
Increase number of stocks -> Efficient Set (highest possible return for a given risk), Minimum Variance Portfolio (MVP).
All hold portfolio on efficient frontier. Combos of efficient portfolios efficient -> market portfolio efficient (CAPM prediction).
Include risk free asset: Portfolios on straight line because no diversification benefit; tangential line upward dominates = Capital Market Line, all positioned here; point on efficient set=M=Market Portfolio, 2 fund gap between r_f and M depends on risk appetite
Asset risk components (market/systemic and specific/diversifiable risk): $\sigma^2(r) = \beta^2\sigma^2(r_m) + \sigma^2(\varepsilon)$
After diversification only market risk remains -> only rewarded for market risk
Security Market Line (Cost of Capital, expected return): $E\{R\} = r_f + \beta(E\{r_m\} - r_f)$
Two components: Risk free rate for bearing no risk, Risk premium for bearing market risk. *Portfolio β= weighted avg stock βs*

Valuing Risky Projects

Company CoC is avg of market valuations of all company projects (value of firm), provides focal point for pricing, comparison
Measuring Equity β/Cost of Equity: Regression, market return vs. equity return; R^2 is percentage market risk.
CI for individual stock βs is wide. Groups of stocks -> better estimate of β. β is not stable over time.
Company Cost of Capital ignoring tax: $r_{firm} \equiv r_{assets} = \frac{D}{V}r_{debt} + \frac{E}{V}r_{equity}$ D, E, and V are market values
Debt level increases -> debt CoC, equity CoC increase. But: D/E ratio no effect on company CoC (r_{firm}). $\beta_{firm} \equiv \beta_{assets} = \frac{D}{V}\beta_{debt} + \frac{E}{V}\beta_{equity}$
Debt level increases -> β_{debt} and β_{equity} increase, β_{firm} unchanged. Financial risk (nature of cash flow claim) increases, asset risk (from nature of assets generating cash flows) unaffected.
$WACC = r_{debt}(1-T_c)\frac{D}{V} + r_{equity}\frac{E}{V}$, T_c: marginal corporate tax rate (WACC after tax)
β Estimation: Avoid errors (adjust cash flow, not DF), cyclicality (1st class): high, catastrophe insurance: low, op. leverage (high FC): high
Certainty Equivalents: Reduce the cash flows to get equivalents to discount at r_f.: $CE = \frac{Risky}{1+\beta(\bar{r}_m - r_f)/(1+r_f)}$

Implementation

Sensitivity Analysis: Helps examine estimate quality (key variables, effects of poor estimates). Prob: Subjective estimates,
Breakeven Sales: Lowest sales to make project viable. Accountancy figures -> reduced breakeven (CoC, depreciation)
Real options (abandon, expand, wait, switch) -> Decision trees. Always increase NPV. Prob: Mkt risk changes, adjust disc. factor
Sources of economic rent: monopoly, market inefficiency, specific skills/knowledge, location, patents, brand
Principal Agent Problems: effort, perks, empire building, risk aversion: monitor through cap structure, perf-based compensation
Accounts Based Comp.: Pros: based on performance -> junior managers, Cons: manipulable, biased measures, SHolder wealth?
EVA: earnings of shareholders after CoC; Pros: CoC visible, applicable to whole business, Cons: not NPV, measures income

Option Valuation

Option contract = right to perform transaction on given date *Price factors*: Time to expiry, current share price to exercise price, Volatility
Call vs. put options. American vs. European options. Premium (cost of option)
Call Spread: Call1–Call2 (Call2 has higher exercise price) *Straddle*: Call+Put, lose if nothing happens *Put-Call Parity:* Call-Put = Future
Option Pricing (Binomial): buy Δ shares, B risk free bonds Option Price = Δ(Share Price) + B/(1+r_f). $\Delta = \frac{C_u - C_d}{Su - Sd}$ $B = \frac{C_u d - C_d u}{u-d}$
General Valuation Formula: $C = \frac{qC_u + (1-q)C_d}{1+rt}$ $q = \frac{1+r\Delta t - d}{u-d}$ Risk neutral prob. of up mvmt $u = e^{\sigma\sqrt{\Delta t}}$ *$d = u^{-1}$* *σ: annualized volatility*
Value options: Compute % up/down, Compute risk neutral probability q, Value option as if risk neutral and q is probability of up movement, Calculate stock prices after n periods, Determine option values, Use q to work backwards to determine option price.
Δ changes every time the share price moves -> hedging required, but self-financing (no extra money in)
Black Scholes Model: infinitesimal Δt (continuous prices moves and hedging):
$c = SN(d_1) - Xe^{-rt}N(d_2)$, Δ = $N(d_1)$, B = $XN(d_2)$ $d_1 = \frac{\ln(S/X) + (r+\sigma^2/2)t}{\sigma\sqrt{t}}$ and $d_2 = d1 - \sigma\sqrt{t}$

Problems w/ Black Scholes: Need ability to hedge; need to hedge continuously -> need liquid share markets, not volatile