Cheating Sheet of

Corporate Finance

☐**EBIT** = Earnings before interest and taxes

☐**Net Income** = (1 - τ)*EBIT, τ : Tax rate.

☐**NWC** = accounts receivable + inventories–accounts payable

☐**Free Cash Flow** = EBIT*(1 – τ) + Depreciation – Capex – Change in NWC

☐ **Change in Net Working Capital** = Increase in Inventory + Increase in Accounts Receivable – Increase in Accounts Payable

Future value

☐**Compounding** an investment C0 *n* times a year for *T* years produces a future value in *T* years of

$$FV_T = C_0\left(1+\frac{r}{n}\right)^{nT}$$

r is the stated annual interest rate (also called annual percentage rate or APR).

n is how many times a year the investment is compounded.

☐ **Effective Annual Rate** (EAR): The rate R compounded annually that is equivalent to the rate r compounded n times per year. Equivalent means they both give the same FV (after one year)

That is, R (the effective annual rate) solves:

$$1+R=\left(1+\frac{r}{n}\right)^{n}$$

☐**Continuous Compounding**: 1+R=exp(r)

☐**Compounding Conversion Formulas**

R_c : continuously compounded rate

R_m: same rate with compounding *m* times per year

$$e^{R_c}=\left(1+\frac{R_m}{m}\right)^{m}$$

Present Value and Net Present Value

☐**Net Present Value** (NPV)

Present value of future cash flows minus Cost of investment today necessary to produce these future cash flows

☐**Discount Rate**

r = "opportunity cost of capital" or "required rate of return"

higher discount rate *r* makes NPV smaller

☐**Annuity:** an asset that pays a fixed sum each year for a specified number of years

e.g.: Mortgage loans

☐**Perpetuity:** an asset that pays a fixed sum forever

e.g.: Preferred stock. Stockholder promised a fixed cash dividend every quarter, forever.

☐**PV of perpetuity** = $\frac{C}{r}$

PV of growing perpetuity = $\frac{C}{r-g}$

☐**PV of annuity** = $\left(1-\frac{1}{(1+r)^T}\right)\frac{C}{r}$

PV of growing annuity = $\left(1-\frac{(1+g)^T}{(1+r)^T}\right)\frac{C}{r-g}$

Investment Decision Rules

☐**The internal rate of return (IRR)**: the discount rate at which the NPV becomes equal to zero.

The IRR Decision Rule works if all negative cash flows precede positive cash flows (–,–,–,+,+,+,+)

When choosing among mutually exclusive alternatives, Choose the option with the highest NPV. Unless the projects have identical scale and timing, don't trust IRR!

☐**Payback**: length of time until the accumulated cash flows equal or exceed the original investment. accept if payback is less than some pre-specified number of years.

Drawbacks: (1) ignores the project's cost of capital and the time value of money (2) ignores cash flows after the payback period (3) relies on an ad hoc decision criterion. bias against long term projects.

Advantages: simple to use; it is a crude measure of liquidity.

☐Discounted Payback.

Capital Budgeting

☐Resource Constraints

Taking all positive NPV projects may not always be feasible or desirable. Resource constraints limit the firm's capacity.

☐ Profitability Index = Value Created / Resource Consumed.

Bond

☐A bond is a legally binding agreement between a borrower and a lender that specifies Par (face) value, Coupon payment / Coupon rate, Maturity date.

☐Coupon rate is expressed as an APR by convention.

$$\text{coupon payment} = \frac{\text{coupon rate} \times \text{face value}}{\text{number of payment per year}}$$

☐ **Term to maturity** (or simply "term"): the time remaining until the final (principle) payment date.

☐**Bond Valuation**

$$P_B = \sum_{t=1}^{T}\left(\frac{C}{(1+r)^t}\right)+\frac{F}{(1+r)^T}$$

$$=\frac{C}{r}\left(1-\frac{1}{(1+r)^T}\right)+\frac{F}{(1+r)^T}$$

☐**Yield to Maturity**

The discount (interest) rate that sets the present value of the promised bond payments equal to the current market price of the bond.

☐Zero-Coupon Bond

Good example: Treasury bills

☐Bond Price = PV(Future Bond Cash Flows)

☐**Accrued interest**=

$$\text{Coupon amount\$} \times \frac{\text{days since last payment}}{\text{days of one period}}$$

☐**clean prices** = dirty price - accrued interest

☐**Arbitrage:** An opportunity to make money without taking any risk. It occurs whenever the *same cash flows* trade for *different* prices.

☐Prices for identical cash flows are the same: "Law of One Price"

$$P=\frac{C}{1+YTM_1}+\cdots+\frac{C+F}{(1+YTM_n)^n}$$

☐**Term Structure of Interest Rates**

Let f_n be the 1-year **forward rate** at year *n* (i.e. 1-year forward rate from year *n* to year *n+1*), y_n is the yield of a zero-coupon bond with a maturity of *n*.

$$1+f_n=\frac{(1+y_{n+1})^{n+1}}{(1+y_n)^n}$$

Let f_n^k be the *k*-year forward rate at year *n* (i.e. *k*-year forward rate from year *n* to year *n+k*).

$$(1+f_n^k)^k=\frac{(1+y_{n+k})^{n+k}}{(1+y_n)^n}$$

☐**Duration**

$$D=\sum_{t=1}^{T}\left(t\times\frac{PV(C_t)}{P}\right)$$

The duration weights each maturity t by the percentage contribution of PV(Ct) to the price.

☐**Modified Duration**

$$\text{Modified Duration}=\frac{\text{Duration}}{1+YTM}$$

$$\%\Delta\text{ bond price} = -\text{ modified duration}\times\varepsilon$$

ε is a small change in the bond's yield.

☐**Duration Rules**

Rule 1. Zero-coupon bond duration = Time to maturity

Rule 2. Holding time to maturity fixed, duration increases with lower coupon rate

Rule 3. Holding coupon fixed, duration increases with time to maturity

Rule 4. Holding other factors fixed, duration is higher when yield to maturity is lower (yield to maturity lower if cash flows are far away)

Risky Bonds and Expected Return

☐**cost of debt**: IRR of expected payments of bonds with the risk of default

$$r_D = r_F + \text{risk premium}$$

$$\text{Promised } YTM = r_D + \text{default premium}$$

☐**Interest Coverage**

We have information on interest coverage for firms which have ratings. We use that to back out a rating.

Bond prices and ratings are related to default probabilities and recovery rates, which depend on firm fundamentals (e.g. interest coverage ratio).

Stock Valuation

☐**Risky Cash Flows**

-Future stock prices are obviously uncertain;

-Dividends are announced shortly in advance, before that there is no commitment;

-Rather than having precise estimates of these cash flows, as an investor you have "expectations". The cash flows here are Expected Values.

☐**Key Dividend Dates**

-Declaration/Announcement Date: The date the board authorizes the dividend. Once declared, it is a legal liability that the firm must pay.

-Record Date: Shareholders of record on this date will receive the dividend. Because it takes 3 days for a share to be registered, the date two days prior is called the ex-dividend date. Buyers of the shares on or after this date will not receive the dividend.

-Payable Date/Distribution Date: The date the dividend is paid to shareholders.

☐**equity cost of capital** r_E

$r_E = r_F + \text{risk premium}$

CAPM

☐**main assumptions**

1.Investors can buy and sell all securities at competitive market prices (without incurring taxes or transaction costs) and can borrow and lend at the risk-free interest rate

2.Investors hold only efficient portfolios of traded securities—portfolios that yield the maximum expected return for a given level of volatility

3.Investors have homogeneous expectations regarding the volatilities, correlations, and expected returns of securities

☐**estimate equity cost of capital by CAPM**

$$r_E = r_F + \beta_i(E[R_{MKT}] - r_F)$$

☐**The Capital Market Line (CML)**

When the CAPM assumptions hold, an optimal portfolio is a combination of the risk-free investment and the market portfolio. When the tangent line goes through the market portfolio, it is called the capital market line (CML).

$E[R_x] = r_F + x(E[R_{MKT}] - r_F)$

$SD(R_x) = xSD(R_{MKT})$

☐**Beta**

$$\beta_i = \frac{SD(R_i)\times Corr(R_i,R_{MKT})}{SD(R_{MKT})} = \frac{\text{Cov}(R_i,R_{MKT})}{\text{Var}(R_{MKT})}$$

☐**The Security Market Line (SML)**

a linear relationship between a stock's beta and its expected return. According to the CAPM, if the expected return and beta for individual securities are plotted, they should all fall along the SML. The SML shows the expected return for each security as a function of its beta with the market. According to the CAPM, the market portfolio is efficient, so all stocks and portfolios should lie on the SML.

☐**Beta of a Portfolio**

The beta of a portfolio is the weighted average beta of the securities in the portfolio.

$$\beta_P = \sum_i x_i\beta_i$$

☐**Summary of CAPM**

The math of optimal portfolio choice: the required return for any investment is determined by its beta with respect to the tangent portfolio (portfolio with highest Sharpe ratio).

Investor preferences: investors care about the expected return and volatility (want highest Sharpe ratio), so they invest in the risk-free asset and the tangent portfolio.

Tangent Portfolio = Market Portfolio

☐**The Market Portfolio**

Market Capitalization: The total market value of a firm's outstanding shares.

☐ **Value-Weighted Portfolio**: A portfolio in which each security is held in proportion to its market capitalization.

☐**Using Linear Regression**

$$R_i - r_F = \alpha_i + \beta_i(R_{MKT} - r_F) + \varepsilon_i$$

β_i represents the sensitivity of the stock to market risk. When the market's return increases by 1%, the security's return increases by β_i%

α_i represents a risk-adjusted performance measure for the historical returns.

-If α_i is positive, the stock has performed better than predicted by the CAPM.

-If α_i is negative, the stock's historical return is below the SML.

☐**Beta from Comparables**

Advantages:

-Beta estimate will usually have a lower error because the volatility of a portfolio of comparables is smaller than the volatility of an individual company.

-Need to use comparables for private companies, because there is no - stock price data.

-Use comparables when estimating market risk of a division of a company

But must be careful to choose good comparables…

☐**Fundamental Determinants of Beta**

1. Correlation with the business cycle

consumer durables are likely to be highly cyclical.

when times are good people replace them but when times are bad they make them last a bit longer.

In contrast, things that people need all the time are not cyclical and hence have low betas.

2.Technology of production: the difference between *fixed* costs and *variable* costs. High fixed costs are known as "operating leverage". Empirical studies suggest that companies with high operating leverage tend to have high betas.

Reason: firm's profit is sensitive to the quantity sold, and so varies with the cycle.

3.Leverage: equity of firms with higher leverage is riskier, and so those firms have higher beta

Dividend-Discount Model

☐***N*-year horizon**

$$P_0 = \frac{\text{Div}_1}{1+r_E}+\cdots+\frac{\text{Div}_n+P_n}{1+r_E{}^2}$$

☐If the firm eventually pays dividends and is never acquired:

$$P_0 = \sum_{n=1}^{\infty}\frac{\text{Div}_n}{(1+r_E)^n}$$

That is, the *stock price should equal the present value of all future dividends.*

Total Payout Model

Dividends and Repurchases are both payouts to equity holders.

$$P_0 = \frac{\text{Value of Equity}}{\#\text{ shares}}$$

$$= \frac{PV(\text{Future Total Dividends and Repurchases})}{\#\text{shares}}$$

☐**Total Payout Rate**

$$P_0 = \frac{(\text{Total Payout Rate})\times EPS_1}{r_E - g_E}$$

☐**Dupont Model of Growth**

$$\text{Earnings} = \frac{\text{Earnings}}{\text{Sales}}\times\frac{\text{Sales}}{\text{Assets}}\times\text{Assets}$$

Unlikely to be sustainable in the long run. Long-term growth generally comes from investment in new assets. This investment is financed (in part) from retained earnings.

Assumptions:

-Net profit margin & Asset Turnover constant

-No equity issues

Δ Earnings = New Investment × Return on New Investment

Earnings growth: $g_e = (1-TPR)\times RONI$

Discounted Free Cash Flow (DCF)

☐Enterprise Value = PV(FCF)

= Equity + Debt – Cash

PV(FCF) is the PV of cash flows from prior investments + NPV of future investments

☐ $EV = \sum_{n=1}^{\infty}\frac{FCF_n}{(1+r)^n}$

-Takes advantage of specific knowledge regarding future FCF.

-Allows incorporation of changing investment opportunities, etc.

-No need to directly consider dividend policy or financing.

☐Terminal Value

Use a "multiples" approach to estimate value beyond the forecast horizon, based on expected long-run growth rate.

$$V_n = \frac{FCF_{n+1}}{r-g} = FCF_n\frac{1+g}{r-g}$$

☐Pricing by DCF

$$P_0 = \frac{V_0 + \text{Cash}_0 - \text{Debt}_0}{\#\text{shares}}$$

Valuation Multiples

☐The Price-Earnings Ratio (P/E Ratio)

Share price divided by earnings per share

$$P/E = \frac{P_0}{EPS_1} = \frac{Div_1/EPS_1}{r_E - g}$$

$$= \frac{\text{Dividend payment rate}}{r_E - g}(DDM)$$

$$= \frac{\text{Total Payout rate}}{r_E - g_e}(TPM)$$

Firms with high growth rates, or which generate cash well in excess of their investment needs so that they can maintain high payout rates, should have high P/E multiples.

☐Enterprise Value Multiples

$$\frac{V_0}{EBITDA_1} = \frac{FCF_1/EBITDA_1}{r_{WACC} - g_{FCF}}$$

EBITDA: earnings before interest, taxes, depreciation, and amortization.

This valuation multiple is higher for firms with high growth rates and low capital requirements (so that free cash flow is high in proportion to EBITDA)

☐Limitations of Using Multiples

-Since firms are not identical, the usefulness of multiples depends on the nature of the differences among comparable firms, and the sensitivity of the multiples to these differences.

-When valuing a firm using multiples, except for the requirement of using a set of comparable firms, there is no clear guidance about how to adjust for differences in expected future growth rates, risk, or differences in accounting policies.

-Comparables only provide information regarding the value of a firm relative to other firms in the comparison set. Using multiples will not help us determine if an entire industry is overvalued.

☐Comparison of Multiples with DCF Methods

-Comparables: a "shortcut" to the discounted cash flow methods of valuation. Rather than separately estimate the firm's cost of capital and future earnings or free cash flows, we rely on the market's assessment of the value of other firms with similar future prospects.

-The multiples approach has the advantage of being based on actual prices of real firms, rather than what may be unrealistic forecasts of future cash flows.

-Discounted cash flows methods have the advantage that they can incorporate specific information about the firm's cost of capital or future growth. The discounted cash flow methods have the potential to be more accurate than the use of a valuation multiple.

Financing Investment

☐Weighted-Average Cost of Capital

$$r_{wacc} = \frac{D}{D+E}r_D + \frac{E}{D+E}r_E$$

☐**Modigliani Miller Proposition**: With perfect capital markets and no taxes, the total value of any firm is independent of its capital structure.

V(Unlevered) = V(Debt) + V(Equity)

Critical Assumption: Perfect Capital Markets.

No Taxes, No Bankruptcy Costs, No Agency Costs, No Asymmetric Information. Securities are fairly priced.

☐Market Value Balance Sheet

Market Value of Equity = Market Value of Assets - Market Value of Debt and Other Liabilities.

☐E + D = U = A

E is the market value of equity in a levered firm;

D is the market value of debt in a levered firm;

U is the market value of equity in an unlevered firm;

A is the market value of the firm's assets.

☐ Leverage and the Equity Cost of Capital(MM Proposition II)

$$r_U = \frac{D}{D+E}r_D + \frac{E}{D+E}r_E$$

$$r_E = r_U + \frac{D}{E}(r_U - r_D)$$

The cost of capital of levered equity is equal to the cost of capital of unlevered equity plus a premium that is proportional to the market value debt-equity ratio.

☐WACC and Beta

$$\beta_U = \frac{D}{D+E}\beta_D + \frac{E}{D+E}\beta_E$$

Leverage and WACC with taxes

☐Capital structure must matter due to its effect on some market imperfection: taxes, bankruptcy costs, agency costs (incentives), differences in Information, security mispricing.

☐Interest Tax Shield

Tax reduction = Corporate Tax Rate × Interest Payments

PV(future interest tax shields)=T_c × PV(future interest payments)

V(Levered Firm) =V(Unlevered) + PV(future interest tax shields)

☐If the firm's marginal tax rate is τ_c. Firm's debt is D permanently.

PV (Interest Tax Shield)=$\tau_c \times D$

V(Levered Firm)=V(Unlevered) + $\tau_c \times D$

☐WACC with Taxes

Pretax WACC:

$$r_{wacc} = \frac{D}{D+E}r_D + \frac{E}{D+E}r_E = r_U$$

WACC with Taxes

$$r_{wacc} = \frac{D}{D+E}r_D(1-\tau_c) + \frac{E}{D+E}r_E$$

$$= r_U - \frac{D}{D+E}\tau_c r_D$$

☐Recapitalization: a type of corporate reorganization involving substantial change in a company's capital structure.

When securities are fairly priced, the original shareholders of a firm capture the full benefit of the interest tax shield from an increase in leverage.

FINANCING INVSETMENT II

1. **WACC**

☐**Implicit Assumptions**

– Risk: Expansion has similar risk to the rest of the firm

– Leverage: Diptron will maintain its D/E ratio going forward

☐**Debt Capacity**

- Def: The amount of debt at a particular date that is required to maintain the firm's target debt-to-value ratio

- Project debt capacity at date 0:
(Target Debt-to-Value ratio) × (EV of investment)
- Project debt capacity at date t:

$$D_t = d^* V_t^L$$

$$V_t^L = \frac{FCF_{t+1} + \overbrace{V_{t+1}^L}^{\text{Value of } FCF \text{ in year } t+2 \text{ and beyond}}}{1 + r_{wacc}}$$

2. **Adjusted Present Value (APV)**
- Def: A valuation method to determine the levered value of an investment by first calculating its unlevered value and then adding the value of the interest tax shield
- $V^L = APV = V^U + PV(Interest\ Tax\ Shield)$
- $r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{D+E} r_D$
- Interest paid in year t = $r_D \times D_{t-1}$
- The interest tax shield is equal to the interest paid multiplied by the corporate tax rate
- When the firm maintains a target leverage ratio, its future interest tax shields have similar risk to the project's cash flows, so they should be discounted at the project's unlevered cost of capital
- Advantage: It can be easier to apply than the WACC method when the firm does not maintain a constant debt-equity ratio; The APV approach also explicitly values market imperfections and therefore allows managers to measure their contribution to value

☐**Constant interest coverage**
- Interest Paid in Year t = $k \times FCF_t$
- PV(Interest Tax Shield) =PV($\tau_c k \times FCF$)= $\tau_c k \times V^U$ so $V^L = (1 + \tau_c k) \times V^U$

☐**Predetermined debt levels**
- When a firm has permanent fixed debt, maintaining the same level of debt forever, the levered value of the project simplifies to: $V^L = V^U + \tau_c \times D$

3. **Flow to Equity (FTE) Method**
- A valuation method that calculates the free cash flow available to equity holders taking into account all payments to and from debt holders
- FCFE calculation

Year	0	1	2	3…
Revenues		40,000	41,600	43,264
Expenses	-35,000	-20,000	-20.8	-21,632
Depreciation		-5,000	-5,200	-5,408
EBIT	-35,000	15,000	15,600	16,224
Interest		-1,250	-1,300	-1,352
Taxes (40%)	14,000	-5,500	-5,720	-5,949
Net Income	-21,000	8,250	8,580	8,923
Net Cap Ex	-32,750	-1,250	-1,300	-1,352
Inc. in NWC	-6,250	-250	-260	-270
Net Borrowing	25,000	1,000	1,040	1,082
FCFE	-35,000	7,750	8,060	8,383…

FCFE = Net Income – (Net Capex) – (Inc in NWC) + (Net Borrowing)
= FCF – (After-Tax Interest Exp) + (Net Borrowing)
Net borrowing at date t = D(t)-D(t-1)
- Because the FCFE represent payments to equity holders, they should be discounted at the project's equity cost of capital.
- Disadvantage: Must compute the project's debt capacity to determine the interest and net borrowing before capital budgeting decisions can be made.

☐**Limits to Debt**
- Bankruptcy costs; Agency costs; Information signaling; Security mispricing
- Economic distress is a significant decline in the value of a firm's assets, whether or not it experiences financial distress due to leverage.
- Agency cost: A cost incurred when there are conflicts of interest between the firm's stakeholders, normally because management has an incentive to make future decisions that do not maximize the total value of the firm (enterprise value)
- Problem of excessive risk-taking and over-investment: When a firm faces financial distress, shareholders can gain at the expense of debt holders by taking a negative NPV project, if it is sufficiently risky
- debt overhang problem: When a firm faces financial distress due to high leverage, it may choose not to finance new, positive NPV projects.
- Equity holders will benefit from the new investment only if: $\frac{NPV}{H} > \frac{\beta_D D}{\beta_E E}$ equity holders invest an amount H in a new investment
- Agency Benefits of Leverage
Increased ownership concentration: Managers with higher ownership concentration are more likely to work hard and less likely to consume corporate perks. Reduced free cash flow: Firms with less free cash flow are less likely to pursue wasteful investments. Reduced managerial entrenchment and increased commitment: The threat of financial distress and being fired may commit managers more fully to pursue strategies that improve operations.

VALUATION

☐Interest coverage=EBIT/Interest expenses

☐ **"Unlevering" and "Relevering" Beta**
$\beta_E = [1 + (1 - T_c) D/E] \beta_A$

MERGES AND ACQUISITIONS

1. **Leveraged Buyout (LBO)**
- A group of investors, often a private equity partnership, makes a bid for the shares of a public company
- Funds to purchase the shares are financed largely by issuing public and/or private debt. This debt is generally collateralized against the assets of the acquired firm
2. **Agency Problems**
- Project generates NPV = –A, but produces private benefits B to the manager (representing "perks")
- Manager owns a fraction λ of the firm's shares
- Manager will adopt this negative NPV project if $\lambda < \frac{B}{A}$
3. **Takeover Defenses**
- Greenmail: pay potential acquirers a fee not to acquire the firm
- Board control: staggered boards and supermajority rules to limit ability of a raider to take control and change management
- Poison pills: right for existing shareholders to purchase shares at a low price in case of change in control
- Golden parachutes: top managers receive certain significant benefits if their employment is terminated because of a merger
- Legislative remedies: lobby politicians to block takeover based on antitrust grounds or other reasons
- Dual class recapitalization: distributing a new class of equity to shareholders with superior voting rights but inferior dividends
4. **Value Creations and Synergies**
☐Operating synergies
- More projects you can take as a combined firm: higher reinvestment, higher growth
- Higher return on capital on existing projects (stronger barriers to entry, competitive advantages): higher growth rate
- How long you can sustain excess returns: longer growth period
- Economies of scale: cost savings in current operations, higher margin, higher base-year EBIT
☐Financial synergies
- Tax benefits (purely tax motivated transactions illegal)
- Added debt capacity: higher debt ratio, lower cost of capital
-Value of Synergy = Value of the combined firm, with synergy –Value of the combined firm, without synergy
5. **Acquisition Premium**
- The most likely explanation is the competition that exists in the takeover market, once an acquirer starts bidding on a target company and it becomes clear that a significant gain exists, other potential acquirers may submit their own bids.
6. Let A be the pre-merger value of the acquirer, T be the pre-merger value of the target and S be the value of the synergies. If the acquirer has Na shares outstanding before the merger, and issues x new shares to pay for the target, the acquirer's share price should increase if

$$\frac{A+T+S}{N_A+x} > \frac{A}{N_A} \Rightarrow x < \left(\frac{T+S}{A}\right) \times N_A$$

$$\text{Exchange ratio} = \frac{x}{N_T} < \left(\frac{T+S}{A}\right)\frac{N_A}{N_T} = \frac{P_T}{P_A}\left(1 + \frac{S}{T}\right)$$

7. **Leveraged buyout**
- Def: Instead of using his own cash to pay for these shares, the acquirer borrows the money and pledges the shares themselves as collateral on the loan
8. **Freezeout merger**
- Def: A situation in which the laws on tender offers allow an acquiring company to freeze existing shareholders out of the gains from merging by forcing non-tendering shareholders to sell their shares for the tender offer price

SECURITY ISSUANCE AND IPOs

1. **Pre-money valuation**: The value of the prior shares outstanding at the price in the funding round
2. **Post-money valuation**: The value of the whole firm (old plus new shares) at the funding round price
- Post-money Valuation = Pre-money Valuation + Amount Invested
3. **Sources of financing**
☐ Angel Investors
Individual Investors who buy equity in small private Firms, but finding angels is typically difficult.
☐Venture Capital Firm
A limited partnership that specializes in raising money to invest in the private equity of young firms.
☐Venture Capitalists
One of the general partners who work for and run a venture capital firm
☐Venture capital firms offer limited partners advantages over investing directly in start-ups themselves as angel investors
(1)Limited partners are more diversified
(2)They also benefit from the expertise of the general partners
☐The advantages come at a cost
(1)General partners usually charge substantial fees
(2)Most firms charge 20% of any positive return they make
(3)They also generally charge an annual management fee of about 2% of the fund's committed capital
4. **Initial Public Offerings (IPOs)**
☐What is an IPO?
- Register securities with the SEC and satisfy information disclosure and other requirements
- New securities are then sold "publicly" to a large number of Investors
- Securities can be traded on a public exchange (subject to additional exchange requirements) and the firm goes "public"
☐Why do an IPO?
– Raise large amounts of capital and make future access to capital easier
– Create liquidity and establish a verifiable market value for shares
– Publicity, Visibility
– But: the process is costly, requires significant information disclosure (ongoing), entails legal risks and regulatory scrutiny, may jeopardize control
☐The IPO Process
(1)Select Investment Banker / Underwriting Team
- Usually there is a lead underwriter, who assembles an underwriting syndicate
- At the IPO date, they will purchase the shares and resell them to investors
(2)Financial Analysis / Due Diligence
- Determine amount of money to be raised in the IPO
- Determine preliminary offer price range (e.g., $12 - $15) based on DCF & Comparables
(3)File Registration Statement with SEC (20-day waiting period)
- Discloses all relevant financial information
- SEC may comment and ask for further disclosures
- Quiet Period Begins (Public Comments Restricted)
(4)Road Show Presentations (~2-3 weeks)
- Market the company to Institutional Investors
- Distribute preliminary prospectus ("red herring")
(5)Pricing / Book-building
- Underwriters obtain indications of potential demand from investors, recording them in "the book."
- Indicated demand often outstrips supply (in some cases by 20:1 or more). But there is no guarantee that this demand will materialize.
- Based on the book, a final offer price is determined the (late) evening before the IPO.
(6)IPO
- Underwriters sell shares to their clients / investors.
- Often, they will ration the allocation of the shares.
- The shares then begin trading on the exchange.
(7) 40 days after IPO: Quiet Period Ends
(8)180 days after IPO: Lock-ups typically expire
☐Underwriting "spread"
- Generally, underwriter commits to buy the shares for 7% below the offer price. It then resells the shares at the offer price – and takes the risk if it can't sell the shares at that price.
☐Green Shoe Provision/Option
Underwriters often have an additional "Green Shoe Provision/Option"
- Allocate (sell) additional shares (often 15%) at the offering price
- Underwriters then buy back these shares if price falls (price support)
☐IPO puzzles
- Cyclicality
- IPO Underpricing
(1) Firms like the positive publicity of a "successful" IPO
(2) Allows underwriters to "pay" their best clients to participate
(3) Some underpricing is necessary to get uninformed investors to participate
-Long-Run Underperformance of IPOs
(1)Investors' over-optimism about firms' future growth potentials
(2)Market-timing of issuing companies
(3)The lottery effect
- The transaction costs of an IPO are high
5. **Seasoned Equity Offering (SEO)**
- The main difference is that a market price for the stock already exists, so the price-setting process is not necessary
- Primary Shares
New shares issued by a company in an equity Offering
- Secondary Shares
Shares sold by existing shareholders in an equity Offering
- Tombstones
A newspaper advertisement in which an underwriter advertises a security issuance
- Cash Offer
A type of SEO in which a firm offers the new shares to investors at large
- Rights Offer
A type of SEO in which a firm offers the new shares only to existing shareholders. Rights offers protect existing shareholders from underpricing
- Issuance Costs
Underwriting fees amount to 5% of the proceeds of the Issue, Rights offers have lower costs than cash offers.

Financial Options

1. A **derivative** is a financial instrument whose value depends on, or is derived from, the value of another asset (underlying asset). Examples: futures, forwards, swaps, options, exotics…
2. **options**
- It is a contract which gives the buyer (the owner) the right, but not the obligation, to buy or sell an underlying asset at a pre-specified strike (exercise) price on or before a pre-specified date (maturity date)
- An option which gives the owner the right to buy an asset at a pre-specified price is referred to as a call
- An option which gives the owner the right to sell an asset at a pre-specified price is referred to as a put
3. **Futures/Forwards**
- These are agreements between two parties to deliver (buy or sell) an asset at a pre-specified future delivery date for a pre-specified future or forward price agreed upon today
- Difference between forwards and futures is that a forward is not traded on an exchange and is not standardized
- Unlike an option, both parties of a futures contract must fulfill the contract on the delivery date, i.e. the seller delivers the underlying asset to the buyer
4. **Why Are Derivatives Important?**
- Derivatives play a key role in hedging and transferring risks in the economy
- The underlying assets include stocks, currencies, Interest rates, commodities, debt instruments, electricity, insurance payouts, the weather, etc.
- Many financial transactions have embedded derivatives
- The real options approach to assessing capital investment decisions has become widely accepted
- Employee stock options
- And speculators/arbitrageurs love them!
(A very large part of investment banking business)
5. **How Derivatives Are Traded?**
- On exchanges such as the Chicago Board Options Exchange (CBOE)
- In the over-the-counter (OTC) market where traders working for banks, fund managers and corporate treasurers contact each other directly
6. A **European call** (put) option on the stock with strike price K and maturity (or expiration) date T (in this case, T = 1) is a security that gives the buyer the right to buy (sell) the stock at maturity at price K.
7. An **American call** (put) option on the stock with strike price K and maturity date T is a security that gives the buyer the right to buy (sell) the stock at any time before and including the maturity date at price K.
8. **Option Quotations**
- At-the-money: An option whose exercise price is equal to the current stock price
- In-the-money: An option whose value if immediately exercised would be positive
- Out-of-the-money: An option whose value if immediately exercised would be negative
- Deep In-the-money: An option that is in-the-money and for which the strike price and the stock price are very far apart
- Deep Out-of-the-money: An option that is out-of-the-money and for which the strike price and the stock price are very far apart
9. **No-Arbitrage Pricing**
☐Put-Call Parity for European options
$c(S,K) + PV(K) + PV(Div) = p(S,K) + S$
☐Intrinsic Value: The amount by which an option is in-the-money, or zero if the option is out-of-the-money. For call, it's $\max\{S-K, 0\}$.
☐Time Value: The difference between an option's price and its intrinsic value
Letting dis(K) = K–PV(K), the "discount" due to interest, $c = S - K + dis(K) + p - PV(Div)$
☐without dividends: for a stock without dividends, an American Call and a European Call are equivalent, with an American put, you want to exercise it early if the time value is negative, i.e. K – S > P(S,K).
American Puts are generally more valuable than European Puts (opportunity to exercise early at the optimum)
☐American calls should not be exercised early unless dividends are paid, interest on strike is low, put value is low
☐American puts may be exercised early when dividends are low, interest on strike is high, call value is low
☐Credit Default Swaps: Risk-free debt = Risky debt + Put option on firm assets
10. **Binomial Pricing Model**
$c_u = \max\{uS - K, 0\}$, $c_d = \max\{dS - K, 0\}$

$$\theta_S = \frac{c_u - c_d}{(u-d)S},\ \theta_B = \frac{uc_d - dc_u}{(u-d)}$$

$$Q = \theta_S S + \frac{\theta_B}{1+r_f}$$

$$c = \frac{1}{1+r_f}\left(\frac{1+r_f-d}{u-d}c_u + \frac{u-(1+r_f)}{u-d}c_d\right)$$

Define $\pi^* = \frac{1+r_f-d}{u-d}$ and $1-\pi^* = \frac{u-(1+r_f)}{u-d}$

$$c = \frac{1}{1+r_f}\left(\pi^* c_u + (1-\pi^*)c_d\right)$$

11. **Risk and Return of an Option**

$$\beta_{option} = \frac{S\Delta}{S\Delta+\theta_B}\beta_S + \frac{\theta_B}{S\Delta+\theta_B}\beta_B$$

$$\beta_B = 0$$

$$so\ \beta_{option} = \frac{S\Delta}{S\Delta+\theta_B}\beta_S$$

☐**Leverage Ratio**
It is calculated as $\frac{S\Delta}{S\Delta+\theta_B}$

12. **Beta of Risky Debt**
☐When the beta of debt is approximately zero, then:

$$\beta_E \approx \left(1+\frac{D}{E}\right)\beta_U$$

☐When the beta of debt is not zero, then:

$$\beta_E = \Delta\frac{A}{E}\beta_U = \Delta\left(1+\frac{D}{E}\right)\beta_U$$

$$\beta_D = (1-\Delta)\frac{A}{D}\beta_U = (1-\Delta)\left(1+\frac{E}{D}\right)\beta_U$$

$$\beta_U = \frac{\beta_E}{\Delta\left(1+\frac{D}{E}\right)}$$

13. **European Option Sensitivities: Δ**
☐Delta: by how much does the value of an option increases as the underlying asset appreciates by $1
☐European calls: Δ ~ 1 for calls deep in the money
Almost certain to exercise; gain $1 for each $1 of stock price
☐Δ ~ 0 for calls far out of the money
Even if stock appreciates by $1, the likelihood of making money is close to 0
☐European puts: Δ ~ -1 for puts deep in the money
Almost certain to exercise; lose $1 for each gain $1 of stock price
☐Δ ~ 0 for puts far out of the money
14. **dynamic hedging**
- put pays more when price is low, maintain a short position in the underlying asset (i.e. Δ < 0)
- the slope of the put option's value becomes steeper as the price falls, this means taking an even larger short position when the underlying asset falls in price (i.e. |Δ| becomes larger as price drops)
- when the price falls, you sell more of the asset.