

Formulas that we have used during the semester

Time-value-of-money formulas:

$$FV = PV \left(1 + \frac{r}{m}\right)^{m \cdot n} \qquad PV = \frac{FV}{\left(1 + \frac{r}{m}\right)^{m \cdot n}}$$

$$PV = \frac{CF}{r} \qquad PV = PMT \left[\frac{1}{r} - \frac{1}{r(1+r)^t} \right]$$

Valuation formulas we talked about that depend specifically on assumptions about growth:

No growth: $Price_0 = \frac{D_0}{r}$

Constant growth: $Price_0 = \frac{D_1}{r-g} = \frac{D_0(1+g)^1}{r-g}$

Two-stage growth: $Price_0 = \left(\sum_{t=0}^N \frac{D_0(1+g_1)^t}{(1+r)^t} \right) + \frac{D_N(1+g_2)}{(1+r)^N}$

Formulas for converting quoted rates to effective rates and for thinking about real versus nominal rates:

$$(1 + EAR) = \left(1 + \frac{APR}{m}\right)^m \qquad (1 + \text{nominal rate}) = (1 + \text{real rate})(1 + \text{inflation})$$

Averages:

$$\bar{r} = \frac{r_1 + r_2 + \dots + r_n}{n} \qquad r_g = [(1 + r_1)(1 + r_2) \dots (1 + r_n)]^{1/n} - 1$$

Formulas related to measuring risk:

$$\hat{\sigma}^2 = \left(\frac{1}{n-1} \sum_i (r_i - \bar{r})^2 \right) \qquad \beta_j = \text{Cov}(r_j, r_m) / \text{Var}(r_m)$$

$$B_{Levered} = B_{Unlevered} \left(1 + (1 - t) \frac{D}{E} \right)$$

Formulas related to measuring the cost of capital (cost of capital related to systematic risk):

$$E(r_j) = r_f + \beta_j (r_m - r_f) \qquad WACC = \frac{E}{E+D} R_E + \frac{D}{E+D} R_D (1 - t_c)$$

Formulas related to exchange rates and parity conditions:

$$R_{US} - h_{US} = R_{FC} - h_{FC} \qquad E(S_t) = S_0 * [1 + (h_{FC} - h_{US})]^t \qquad E(S_t) = S_0 * [1 + (R_{FC} - R_{US})]^t$$

$$P_{FC} = S_0 * P_{FC}$$

Formulas that relate to the tradeoff theory of capital structure:

$$V_L = V_U + t * D - PV(\text{Financial distress}) \qquad \Delta V_{\text{firm}} = \Delta V_{\text{Unlevered}} + \Delta V_{\text{TaxShield}} - \Delta V_{\text{distress_related_costs}} - \text{fees}$$

Formulas that relate to mergers and acquisitions:

HHI = sum of squares of market shares for firms within an industry

$$V_{AB} = V_A + V_B + \Delta V$$

Formula that relates to Black-Scholes value of a call option:

$$c = S * N(d_1) - E * e^{-rt} * N(d_2) \quad \text{with} \quad d_1 = \frac{\ln\left(\frac{S}{E}\right) + (r + .5\sigma^2)t}{\sigma\sqrt{t}}$$

$$d_2 = d_1 - \sigma\sqrt{t}$$

Lecture 1 Questions

1. What is a corporation? Who owns it?
2. What is the managers' fiduciary duty? What should managers overarching business goal be?
3. How do people become directors?

Lecture 2 Questions

1. What is the formula for calculating the present value of a cash flow (cf_6) in year 6 if r is the annual rate?
2. What is the formula for calculating the future value of a current cash flow (cf_0)? Assume the future value is in year 6 and that r is the annual rate.
3. How do the above 2 formulas change if there is monthly compounding?
4. How do you use continuous compounding in the time-value-of-money formulas?
5. What is the difference between an annuity and a perpetuity?
6. What is the formula for the present value of an annuity? What do each of the inputs mean?
7. Assume as a manager you have several possible projects that you could fund. What are the decision rules that help you make this decision?
8. Describe what the IRR, NPV, Payback decision rules are. As part of your description state what the weaknesses and benefits are for each of the decision rule.
9. What is meant by the term "hurdle rate"? How does it relate to the cost of capital?
10. How do you write a model for the value of the firm?
11. How does the idea of an opportunity cost relate to the discount rate?
12. What is the difference between an annuity and an annuity due?
13. Does the IRR calculation require you to know your cost of capital? How does the IRR relate to the cost of capital?
14. Under what scenario can there be more than one IRR for a project?
15. If as a manager you are choosing between mutually exclusive projects, can the IRR lead you astray?

Lecture 3 Questions

1. What is the difference between a "quoted rate" and an "effective rate"?
2. What is meant by the "term structure of interest rates"?
3. When are APRs equal to EARs?
4. Given a quarterly rate, how do you convert this into an effective annual rate?
5. Suppose your credit card charges 12% APR with monthly compounding. What is the effective 1 month rate in this case? What is the EAR in this case?
6. How does the term structure of interest rates relate to the following ideas: nominal interest rates, pure time value of money, inflation?
7. What is the usual shape of the yield curve? What does an inverted yield curve imply?
8. Describe what a Treasury inflation-indexed security is.
9. What is the CPI? Is it the level or the change in CPI from year to year that is interesting?

10. How is the CPI measured?
11. What has US annual inflation averaged over the last 20 or so years?
12. Is “purchasing power” describing nominal dollars or real dollars?
13. Is it possible to receive a raise at work each year and still be worse off across time? How?
14. What is the Fisher Equation? How is it sometimes approximated?
15. Say you invested in the stock market over 5 years. During this time your investment went from \$1000 to \$1300. Is this 30% return nominal or real?
16. Can you discount nominal cash flows with real rates?
17. Say you observe a 10-year TIP yield of 2% and a 10-year government bond yielding 5%. Why is there a difference in rates for the same horizon?

Lecture 4

1. Assuming risk is measured using standard deviation of returns across time. What has been the general risk-return relationship observed in historical returns on T-bills versus AAA bonds and stocks.
2. How do you calculate 95% confidence intervals on a normal curve?
3. How do you calculate an arithmetic average? Assume you have returns r_1, r_2, r_3
4. How do you calculate the geometric average? Assume you have returns r_1, r_2, r_3
5. What is the relation between standard deviation and variance?
6. What information does “ $(r_m - r_f)$ ” capture in the CAPM? Why is r_m different from r_f to begin with?
7. What has been the average risk premium in the US in recent decades? Why do different people say different numbers for risk premiums?
8. Are risk premiums the same across countries?
9. What is meant when someone says that the “markets are efficient”?
10. What types of news events affect prices?
11. What does it mean if a firm announces it beat its earnings expectation but the stock price falls?
12. How do prices become efficient?
13. How does market efficiency relate to how hard it is to predict future price changes?
14. Is private information already part of prices? How do you know?
15. What is the difference between “total risk” versus “systematic risk”?
16. Which type of risk does the CAPM suggest is compensated? I.e., does the CAPM say you should expect to be compensated for holding either “idiosyncratic” or “firm specific” risk?
17. In a portfolio, is the portfolio return the average of the individual assets’ returns in the portfolio?
18. In a portfolio, is the portfolio risk the average of the individual assets’ risks in the portfolio?
19. If you are investing all your money in 3 assets do you want those assets to have highly correlated returns across time? Why or why not?
20. Does diversification eliminate market risk?

21. What is the SML? What is on the Y-axis? What is on the x-axis? What is the intercept? Does each firm have its own SML?
22. Is beta a measure of total risk?
23. Why must the long-term expectation for the reward-to-risk ratio be the same across tradeable assets?
24. What does “alpha” look like on the SML?
25. What does a beta of 0 mean? 1? 1.2?
26. Is the portfolio beta the weighted average of the betas of the assets in the portfolio?
27. Does the CAPM predict a linear relation between expected returns and systematic risk?
28. Does the CAPM suggest that total risk is compensated?
29. What does a CAPM expected return mean to an investor in Boeing? What does it mean to the managers at Boeing?

Lecture 5

1. What is a bond?
2. What happens to a firm that can't make its bond payments?
3. What do the following bond-related terms mean?
 - a. Par value, face value, coupon rate, maturity date, term,
4. How do you model the value of a bond?
5. As the time-to-maturity decreases what does the bond price do?
6. What is a catastrophe bond?
7. What is meant by “interest rate risk” when talking about a bond?
8. What is meant by “credit risk” when talking about a bond?
9. What credit ratings are considered “junk” or “high yield” bonds?
10. How is the yield-to-maturity for a bond calculated?
11. What is the difference between the flat and invoice (dirty) price for a bond?
12. What is the accrued interest on a bond?
13. Would a zero coupon bond have accrued interest?
14. What are 2 agencies that provide credit ratings?
15. Who pays for credit ratings?
16. What is the maximum amount that the accrued interest can be?
17. What are the differences between owning debt versus stock?
18. What are the formulas for the following valuation models?
 - a. No growth
 - b. Constant growth
 - c. Two stage growth
19. How do you model the value of a firm if it pays few or no dividends? Is this type of firm inherently worth less than a firm that pays high dividends?
20. Which discount rate is used for equity cash flows? Which discount rate is used for debt cash flows? Which discount rate is used for FCFs?

21. How do you use a multiples approach when valuing a firm? What assumptions are involved with using multiples?

Lecture 6

1. How do you write a formula for the value of a firm? A project?
2. If the cash flows that go into the firm-valuation formula are at the share level, then what have you valued (i.e., what does the left-hand side of the equation represent)?
3. Assume you discounted FCFs to value the entire firm. What do you need to do with this number to convert it into a per-share valuation?
4. What discount rate should be used to discount FCFs?
5. How do you convert EBIT to FCFs? Why would you want to?
6. What are 2 ways that you can calculate R_E ?
7. What are 2 ways that you can approximate R_D ?
8. Why is this relation generally true? $R_f \geq R_D \geq wacc \geq R_E$
9. What is the formula for wacc? Can you describe and calculate all inputs?
10. Should a multiple-division firm use its firm-level wacc to discount projects in all its divisions? Explain.
11. What is the difference between a levered and an unlevered beta? What formula relates the two? Can you describe the intuition for the formula?
12. What assumption does the formula in the prior question make about the beta of debt?
13. When we assume that 2 firms have the same asset beta, what exactly are we assuming?
14. Do leverage choices affect firm risk?
15. If you use an equity beta in the CAPM what is the left-hand side equal to?

Shuksan takeaways

1. Practice converting accounting numbers to FCFs
2. Learn guiding principles for selecting forecasting horizon.
3. Practice modeling terminal values.
4. Learn guiding principles for terminal growth assumptions.
5. Practice calculating cost of equity.
6. Practice valuing a firm in a spreadsheet.
7. Practice using a multiples approach.
8. Reaffirm idea that firm valuation is a present value exercise.

JetBlue takeaways

1. Learn and discuss IPO process. Discuss costs and benefits of being public.
2. Practice applying discounted cash flow valuation of a firm having an IPO.
3. More practice with multiples.
4. Create awareness of survivorship bias when thinking about peer firms and comparables.

5. Practice leveraging and unlevering betas; practice calculating “bottom up” betas.
6. Practice combining DCF and multiples approaches to valuation to find the implied terminal growth.

Lecture 9

1. What is arbitrage? Can it exist long-term? How does this insight lead to the idea for the “law of one price” (aka “parity conditions”)?
2. What is the forex or FX market? Where is it located?
3. What is a spot exchange rate? (S_0)
4. What is a forward exchange rate? (F_t)
5. What is an expected spot exchange rate?
6. What is a cross rate?
7. How do you interpret the (absolute) purchasing power parity formula shown below? Assume FC is for foreign country. $P_{FC} = S_0 * P_{FC}$
8. What frictions can cause the absolute purchasing power parity to be violated?
9. How does relative purchasing power differ from absolute purchasing power? $E(S_t) = S_0 * [1 + (h_{FC} - h_{US})]^t$
10. What does the interest rate parity condition suggest about long-term arbitrage opportunities across currencies and risk free rates in different countries?
11. How do you interpret the international Fisher effect? $R_{US} - h_{US} = R_{FC} - h_{FC}$
12. Given a set of foreign cash flows and a home-country discount rate, what do you have to do in order to apply the time-value-of-money formulas?

Lecture 10

1. In the valuation models we have used thus far in the course, how do we account for risk?
2. What is the “with and without” principle? What does this principle say about expected cannibalization of sales given the adoption of a new project?
3. What does the “with and without” principle say about sunk costs?
4. Assume firm A was going to buy firm B. Would firm A use firm A’s wacc when valuing firm B?
5. When thinking about a firm with multiple divisions, how does finding a “pure play” competitor help the analysis? What assumptions are being made?
6. Do we use market or book values in wacc calculations?

Lecture 11

1. What is the static tradeoff theory for capital structure?
2. What is the pecking order theory for capital structure?
3. If your company existed in a country without tax-deductibility of interest payments, would debt funding have advantages over equity?
4. What factors would predispose a firm to not use debt?

5. How does firm-life-cycle ideas affect the choice of using debt vs equity?
6. What does the M&M proposition say? What is the value of M&M's proposition?
7. Can you describe the intuition behind and use the following equations?
 - a. $V_L = V_U + t * D - PV(\text{Financial distress})$
 - b. $\Delta V_{\text{firm}} = \Delta V_{\text{Unlevered}} + \Delta V_{\text{TaxShield}} - \Delta V_{\text{distress_related_costs}} - \text{fees}$
8. Intuitively, what are financial distress costs? Are these the same as bankruptcy costs?
9. Does the tax-deductibility of interest payments affect the pre-tax value of the firm?
10. What assumptions allow us to write "t*D" in the above-mentioned equation as the value of the tax shield?
11. Under M&M Proposition 1 what is the effect on wacc of increasing D?
12. Now add tax to the prior question. What is the effect on wacc of increasing D?
13. Now add both tax and the costs of financial distress. What is the effect on wacc of increasing D?

Esterline takeaways

1. Additional practice with discounted cash flow valuation.
2. Additional practice with forecasted cash flow spreadsheet analysis.
3. Practice calculating WACC inputs.
4. Practice thinking about and calculating divisional level discount rates. Practice using comparable firms.

Alaska Air takeaways

1. Practice looking at financial ratios of peers when thinking about capital structure
2. Practice using $\Delta V_L = \Delta V_U + \Delta t * D - \Delta PV(\text{Financial distress})$ formula
3. Reinforce idea that gains in the value of the capital structure net of increased financial distress costs accrue to the equity holders.
4. Practice thinking about whether firms would be able to use full tax shield.

Lecture 14

1. What are the different ways that management can return cash to shareholders? What are the costs and benefits of each method?
2. Over the last 2 decades what has happened to the number of firms paying dividends versus using share repurchases?
3. Do increases in regular dividends send the same signal as special dividends? How are the signals similar? How are they different?
4. Why does a stock start trading ex-dividend before the date of the payment of a dividend?
5. Who makes dividend decisions at a firm?
6. What is the timeline of events for dividend decisions?

7. As a shareholder, if the firm does a stock split, does your wealth increase?
8. What is the common reason cited by managers for doing a stock split?
9. What are 2 potential reasons why managers might decide to do reverse stock splits?
10. When a firm does a stock repurchase, where do the purchased shares show up on the financial statements?
11. Do the treasury stock shares have voting rights? Receive dividends? Should they be included in the shares outstanding?
12. What does it mean when someone says “corporations smooth dividends”?

Dividend Policy at Linear Technology takeaways

1. Practice thinking about the tradeoffs between dividends versus share repurchases.
2. Practice thinking about having future earnings sufficient to pay current levels of dividends in the future.
3. Practice thinking about the information content in dividend changes.
4. Discussion of how returning cash to shareholders can make bondholders unhappy.
5. Discussion of agency costs associated with managers amassing large amounts of cash.

Lecture 16

1. What are the 3 legal forms of acquisitions discussed in your book?
2. Which of these 3 forms of acquisitions typically require shareholder approval?
3. What is meant by “horizontal” and “vertical” mergers?
4. What is a proxy fight? Who are some of the shareholder activists we have discussed in class that have led proxy fights?
5. What is a rough estimate of the average merger premium offered by the acquiring firm for the target firm?
6. Why is a premium paid?
7. Why would the Federal Trade Commission prevent some mergers from occurring?
8. What is the Herfindahl-Hirschman Index? What is its maximum value?
9. How does the HHI index relate to mergers?
10. Why would the acquisition valuation of a target firm be different from its stand-alone valuation?
11. Based on historical evidence, do acquiring or target shareholders generally get most of the value of the merger-related synergies?
12. Assume you have an entrenched CEO at the acquiring firm that has personal reasons for “empire-building” via acquisitions. The CEO is considering acquiring a relative large target firm that has only a few very large shareholders. Would the CEO push for a cash or stock acquisition? Why?
13. Name several anti-takeover defenses that firms can use.
14. Assume you are a good manager and an activist shareholder buys 2% of your firm’s outstanding shares and starts agitating for change. What can you do as the manager?
15. What is a golden parachute? How do they align incentives?
16. Do poison pills increase or decrease firm value? Are they good for shareholders?

Sun Microsystems takeaways

1. Showcasing real-world issues that surround acquisition decisions.
 - a. Example of price movements around announcements
 - b. Example of HHI index considerations affecting acquisition decisions
 - c. Example of a firm using dividends to signal strength during recession.
2. Discussion of which peer firms should be used in comparable analysis
3. Discussion of using target's discount rate when valuing the target firm and not using the acquirer's discount rate.
4. Practice incorporating synergies into a spreadsheet firm valuation.
5. Discussion of how CEO pay is related to firm size
6. Discussion of costs and benefits to acquiring and target CEOs in mergers.

Lecture 18

1. What is the difference between hazard risk and financial risk?
2. What are forward contracts? Futures contracts? How are they different?
3. How is a swap contract like a series of forward contracts?
4. What does it mean if you pay an "actuarially fair price" for insurance?
5. When using a risk profile diagram to think about your firm's risk exposure, what goes on the x-axis? What goes on the y-axis?
6. What does an upward sloping risk profile mean for you firm relative to the price of an important input into your production function?
7. How would you draw Southwest's risk profile relative to jet fuel prices?
8. Describe the intuition behind how Southwest could use the following contracts to hedge their exposure to jet fuel price changes:
 - a. Forward contracts
 - b. Futures contracts in crude oil
9. If you are "long" in a forward contract for an asset are you agreeing to buy or sell the asset at the future date?
10. Does hedging price risk only prevent losses or does it also affect your possible upside?
11. What does it mean that futures contracts are market to market?
12. What is meant when some says that futures contracts, unlike forward contracts, have little or not credit risk?
13. Name several of the commodities that are covered by futures contracts.
14. If you are long in a corn future contract, will you lose or gain money if the settle price increases over time?
15. Can you describe the ideas behind an interest rate swap?

Lecture 19

1. In a capital budgeting context, what types of managerial options should you consider? (Note that 2 of these were showcased in the extended review problem posted on Learning Suite.)

2. What is the difference between “static” NPV versus considering managerial flexibility with NPV calculations?
3. What is difference between “American” versus “European” options? All else equal, which is worth more? Which type of option is modeled in the Black-Scholes formula?
4. Describe the intuition for how Southwest could have used call options in the stock market to hedge the cost of jet fuel.
5. What does the payoff to a call option look like? In the figure what goes on the x-axis? At what point on the x-axis does the payoff line bend upwards?
6. Describe in general terms how you would incorporate the option to abandon a project in an NPV analysis.
7. What do these option-related terms mean?
 - a. At-the-money
 - b. In-the-money
 - c. Out-of-the-money
 - d. Strike
 - e. Exercise price
8. Why is an “at-the-money” call option worth something more than 0?
9. At expiration what is the payoff to a call option?
10. In the Black-Scholes formula in what years dollars is S ? E ?
11. In the Black-Scholes formula what is the purpose of “ e^{-rt} ”?
12. What are the $N(d_1)$ and $N(d_2)$ elements of the Black-Scholes formula?
13. In the equation shown below what is the “ c ” in words? $c = S * N(d_1) - E * e^{-rt} * N(d_2)$
14. What general factors make options more valuable?
15. Why do people think about employee stock options as “aligning incentives”?
16. You are a manager considering a new project. The project starts with a test phase. Depending on the results in the test phase the firm may decide to then pursue the second phase of the project. Should you include the value of the second phase in the NPV calculation of the test phase? How might you do this?

Arundel takeaways:

1. Real-world example where managers are making a valuation decision today knowing that they will receive updated information in the future that will affect their future decisions.
2. Practice applying Black-Scholes to a real-options problem.
3. Make the point that you can use a decision tree approach with NPV analysis to incorporate the idea of options into your analysis.

Lecture 21 (also see questions posted on Learning Suite for this lecture)

1. Who elects board members? What factors affect board members’ motivation?
2. Name 3 committees made up of board directors that we discussed in class.
3. What is the difference between “independent” versus “inside” directors?

4. Where does the money come from that executives decide how to use on a daily basis? Who does it belong to?
5. What is a fiduciary duty?
6. Who does management have a fiduciary duty to?
7. How can you, as management, try to meet your fiduciary duties? What should your overarching objective be within existing legal bounds? How does this overarching idea relate to (a) capital budgeting decisions, (b) financing decisions, (c) payout policy decisions, (d) merger decisions, and (e) risk management decisions?
8. Do equity and debt holders have the same incentives? Why not?
9. Describe examples of how executive might have incentive not in alignment with shareholders' wishes. What mechanisms exist that can help align the incentives?
10. Describe the logic behind the argument that destaggering boards can be good for corporate governance.
11. Describe the logic behind the argument that golden parachutes help shareholders.