Final Exam Review

Conceptual Questions for Module 5 (Introduction to security analysis and valuation)

1. The value (price) of a share of stock can be modeled as the present value of what kind of cash flows? Which discount rate should be used in this model?
    - The value (price) of a share of stock can be modeled as the PV of all the future cash flows that will come to the stockholder. These cash flows can be dividends and/or the cash from the future sale of the stock. The dividend discount model models the price as the PV of an infinite series of dividends.
    - If the cash flows are equity cash flows (stockholders are equity holders) then the discount rate should be the cost of equity (r_E).
2. What are 2 ways to calculate the cost of equity for a firm?
    - You can use the CAPM to solve for a firm's cost of equity. To use the CAPM you would need the risk-free rate (r_f), the firm's equity beta (β_j), and the market risk premium (r_m-r_f). The equity beta for a firm can be estimated from a regression of that firm's historical excess returns on the market excess returns. For example, the cost of equity for firm j using the CAPM would be: $E[r_{E,j}] = r_f + \beta_j(r_m-r_f)$.
    - The cost of equity (r_E) at a firm is larger than the cost of debt (r_D) at that firm. So if you know the r_D then you can add a spread to get a rough estimate of the r_E. The spread would depend on the riskiness of the firm. For example, if the spread was 6% then your rough estimate for the cost of equity would be $r_E = r_D + .06$. You won't need to use this method on the final exam.
3. What kind of risk is related to the expected return according to the CAPM?
    - The CAPM focuses only on systematic risk. This type of risk is also called market risk. The CAPM assumes that all investors choose to be diversified.
4. The value (price) of a bond can be modeled as the present value of what kind of cash flows? Which discount rate should be used in this model?
    - The value (price) of a bond can be modeled as the PV of all the future cash flows that will come to the bondholder. These cash flows can be coupon payments and the final face value of the bond. If the bondholder sells the bond before maturity then the future price at which the investor sells the bond would be a cash flow in the model instead of the face value.
    - The cash flows tied to a bond are debt cash flows. This means the discount rate should be the cost of debt (r_D).
5. What are 2 ways to estimate the cost of debt?
    - If the firm has a bond that has been recently traded and that does not have special features (i.e., not callable, not collateralized, etc.) then the yield-to-maturity on that bond can be used as an estimate of the cost of debt.
    - The cost of debt is larger than the risk-free rate. So one way that you can get a rough estimate of the cost of debt at a firm is by adding a spread to the risk-free rate. The spread would depend on the riskiness of the debt cash flows at that firm. For example, if the spread at a given firm was 3% then the rough estimate for the cost of debt would be $r_D = r_f + .03$. You won't need to use this method on the final exam.
6. Can you calculate the price of a bond given information about the bond's coupon rate, time until maturity, and yield to maturity?

- See the example problems in the lecture on bonds

7. Can you calculate the yield to maturity on a bond given information about its price, coupon rate, time until maturity?
    - See the example problems in the lecture on bonds
8. Which bond characteristics make a bond's price more sensitive to interest rate changes?
    - This question is about interest rate risk. In general, the prices of bonds with lower coupon rates and longer time-until-maturities are more sensitive to interest rate changes. A zero-coupon bond would be the lowest coupon rate possible (i.e., a coupon rate of 0).
    - Note that the price of a coupon bond can range below and above the face value depending on how large the discount rate is compared to the coupon rate. In contrast, the price of a zero coupon bond will always be less than the face value of the bond.
9. When do most bond defaults occur?
    - During years when the market is down. Bonds with lower credit ratings are more likely to default than investment grade bonds.
10. Which bond ratings are considered investment grade versus junk?
    - See the lecture on bonds.
11. When using a discounted cash flow (DCF) approach to estimate the value of a share of stock and/or to estimate the value of a firm, the projected future cash flows extend indefinitely into the future as an infinite series. During the semester we talked about different ways to calculate the PV of an infinite series. What are the 3 approaches to modeling infinite cash flows that we talked about?
    - (No Growth Assumption) Assume the infinite series of cash flows does not grow over time. Under this assumption you can use the formula for a perpetuity to calculate the PV of the series. The generic formula is PV = CF/r.
    - (Constant Growth Assumption) Assume the infinite series of cash flows grows at a constant rate over time. Under this assumption you can use the formula for the Gordon Growth model (also known as a growing perpetuity or constant growth model) to calculate the PV of the series. The generic formula is $PV = CF_1 / (r – g)$ where CF_1 is the year 1 cash flow in the series and PV is in year 0 dollars and is the PV of the entire series.
    - (Two-Stage Approach) Under this approach you break the infinite series of future cash flows into 2 sections (2 stages). The first stage calculates the PV of the first N cash flows. The second stage calculates the PV of the infinite series of future cash flows that start with the cash flow in year N+1 and extend into the future. Together, the 1st and 2nd stages account for the PV of the entire infinite series of future cash flows. The PV of the second stage infinite series is usually modeled as either a perpetuity or a growing perpetuity.
12. What are some settings in which a two-stage model might be appropriate?
    - If the firm is going through extremely high growth in the next couple of years then the two-stage model allows you to include a very high growth rate (that is not sustainable forever) for the first N years (i.e., over the first stage years) and then to use a lower more sustainable growth rate for the infinite series in the second stage that starts with a cash flow in year N+1 and extends into the future.

- If the cash flows are expected to be highly irregular for the next couple of years (e.g., some positive, some negative years depending on planned large capital investments) then you can model the cash flows in the first N years year-by-year. Under this approach the stage 1 calculations are done year-by-year to accommodate planned expenditures and/or developments that aren't easily modeled as part of a long-term trend. You would only use this approach if you had a good sense of major expenditures and/or developments over the next couple of years. After this irregular period (stage 1) is finished, you could then make the simplifying assumption that all cash flows after the first stage (starting in year N+1 and extending forward in time) would then grow at a fixed rate going forward.
- Early stage/young firms often experience either high and/or irregular growth for some number of years making the two-stage model useful for these types of firms.

13. How can you estimate the value of a share of stock if a firm does not pay dividends?
    - Instead of modeling the share price as a function of future dividends per share, you can model the enterprise value as the present value of the firm's future FCFs. The following equations show the logic. "E" is the overall market value of equity at the firm, "D" is the overall market value of debt.
        - Enterprise Value = PV of all future FCFs
        - Enterprise Value = D + E - Cash
        - This means you can estimate the value of a single share by first solving for the Enterprise Value and then subtracting D and adding Cash to get an estimate of E. You would then divide E by the number of shares outstanding to get a per-share estimate. The formula would be something like this:
          share price = (Enterprise value – D + Cash)/(number of shares outstanding)
14. What are the similarities and differences between the dividend discount model (DDM) and the discounted free cash flow model (DFCF)?
    - Both models calculate the PV of a stream of future cash flows.
    - Both models can be estimated using perpetuity or growing perpetuity formulas.
    - The DDM focuses on dividends and uses the cost of equity as the discount rate in the formula.
    - The DFCF model focuses on FCFs and uses the WACC as the discount rate in the formula. If a firm does not have any debt (D=0) then the WACC would equal the cost of equity in this situation. The WACC is the weighted average of the cost of debt and the cost of equity but if a firm has no debt, then in the weighted average 100% of the weight would be on the cost of equity.
15. What is the difference between "Firm Value" and "Enterprise Value"?
    - Generally "Firm Value" means "D + E" or "Enterprise Value + Cash". Sometimes people also use the words "Firm Value" when referring to Enterprise Value.
    - Enterprise Value is better defined as the PV of future FCFs. This means that Enterprise Value = D + E – Cash.
16. The enterprise value can be modeled as the present value of what kind of cash flows?
    - Free Cash Flows (FCFs). When you discount FCFs you should use the WACC.
17. What is the formula for FCF?

- FCF=EBIT(1-tax rate)+Depreciation -Capital Expenditure -change in NWC
- FCFs are calculated each year

18. The lectures focused on bond, stock, and firm valuation topics introduced several formulas. Some of your homework assignments also asked about these formulas Three examples are shown below. Can you describe what the different parts of these formulas are doing? Assume that the D, FCF, wacc, g_1, and g_2 notation are consistent with the notation used in lecture.

- Share Price$_0 = \left(\sum_{t=0}^{N} \frac{D_0(1+g_1)^t}{(1+r)^t}\right) + \frac{\frac{D_N(1+g_2)}{r-g_2}}{(1+r)^N}$
    - This formula is a two-stage dividend discount model. The discount rate would be the cost of equity. The g_2 growth rate would likely be smaller than the g_1 growth rate because the second growth rate would extend into the future. The second stage is based on a growing perpetuity model in this example. The first stage is shown in the first large parenthesis and represents the PV of the first N dividends. The second stage that appears after the plus sign in the middle of the formula outside the parenthesis represents the PV of the infinite series of dividends that start in year N+1 and extends into the future.
- Enterprise Value$_0 = \left(\sum_{t=0}^{N} \frac{FCF_0(1+g_1)^t}{(1+wacc)^t}\right) + \frac{\frac{FCF_N(1+g_2)}{wacc-g_2}}{(1+wacc)^N}$
    - This formula is a two-stage discounted free cash flow model. The discount rate would be the wacc. The g_2 growth rate would likely be smaller than the g_1 growth rate because the second growth rate would extend into the future. The second stage is based on a growing perpetuity model in this example. The first stage is shown in the first large parenthesis and represents the PV of the first N free cash flows. The second stage that appears after the plus sign in the middle of the formula represents the PV of the infinite series of FCFs that start in year N+1 and extend into the future.

- $Enterprise\ value = \frac{FCF_1}{(1+wacc)^1} + \frac{FCF_2}{(1+wacc)^2} + \cdots$
    - This formula calculates the Enterprise Value as the present value of an infinite series of FCFs. The way this formula is written doesn't specify any specific growth rate between years.

19. How would the two-stage models shown in the prior question change if the second stage infinite series were modeled with a no-growth assumption instead of a constant growth assumption?

- Share Price$_0 = \left(\sum_{t=0}^{N} \frac{D_0(1+g_1)^t}{(1+r)^t}\right) + \frac{\frac{D_{N+1}}{r}}{(1+r)^N}$
    - This formula is a two-stage dividend discount model. The discount rate would be the cost of equity. The second stage in this example is modeled as a perpetuity instead of a growing perpetuity.
- Enterprise Value$_0 = \left(\sum_{t=0}^{N} \frac{FCF_0(1+g_1)^t}{(1+wacc)^t}\right) + \frac{\frac{FCF_{N+1}}{wacc}}{(1+wacc)^N}$

- This formula is a two-stage discounted FCF model. The discount rate would be the wacc. The second stage in this example is modeled as a perpetuity instead of a growing perpetuity.

Conceptual Questions for Module 6 (Introduction to derivatives, futures, and funds)

1. What are call options? What are put options?
   - A call option is a contract that grants the owner the right - but not the obligation - to buy an underlying asset at the strike price (also known as the exercise price).
   - A put option is a contract that grants the owner the right - but not obligation - to sell the underlying asset at the strike price (also known as the exercise price).
2. What do these terms mean? Strike price, exercise price, at the money, in the money, out of the money, option writing, American vs European options
   - See the lecture on options and assigned reading for definitions
3. What do call and put option payoff diagrams look like? What is the payoff to a call option at maturity? How do the payoff diagrams change if you write the call? At what price do the payoff lines switch from being horizontal to having a slope of 1?
   - See the lecture on options for additional examples
   - Example of payoff diagram:

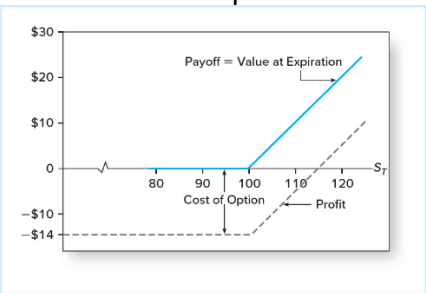

Figure 20.2 Payoff and profit to call option at expiration

   - The payoff line switches from a horizontal line at $0 to a line with a slope of 1 at the strike price.
   - Note that a positive payoff to a call option does not guarantee a profit. You can see this idea by comparing the payoff and profit lines in the figure.
4. Which option contracts would you want to buy if you thought the underlying stock price was going to increase? Decrease?
   - The payoff to a call option is increasing as the underlying stock price increases.
   - The payoff to a put option is increasing as the underlying stock price decreases.
5. When would you potentially use a Protective Put, or a Covered Call, or a Long Straddle option strategy?
   - See the lecture on options
6. What are the 2 approaches we talked about in lecture for valuing options?
   - Black Scholes option pricing formula
   - Binomial lattice valuation approach
7. Of these 2 approaches, which uses a continuous distribution to model future possible outcomes? Which uses a small discrete set of outcomes to model future possible outcomes?
   - The Black Scholes model uses a continuous distribution, the binomial lattice uses a small discrete set of possible outcomes. For an example of the binomial lattice approach, see the below section “Example Test Problems”: Question 11.
8. Which factors affect the value of a call option?

Table 21.1

Determinants of call option values

If This Variable Increases . . .	The Value of a Call Option
Stock price, S	Increases
Exercise price, X	Decreases
Volatility, σ	Increases
Time to expiration, T	Increases
Interest rate, r_f	Increases
Dividend payouts	Decreases

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9. If you wrote a call option, what outcome would cause you to lose money?
    - If the underlying stock price increased in value enough above the strike price
10. What are futures and forward contracts? How are futures different than forwards? How are they different than options?
    - Futures and forward contracts are like options in that they specify purchase or sale of some underlying asset at some future date. Futures, unlike forwards, are standardized and trade on exchanges. Forward contracts are often customized for specific trade partners.
    - The key difference between futures and options is that the holder of an option is not compelled to buy or sell and will not do so unless the trade is advantageous ("in the money"). A futures or forward contract, however, carries the obligation to go through with the agreed-upon transaction or to take steps to exit the position.
11. Why do producers participate in the futures market? Why do investors participate?
    - Futures contracts help producers reduce uncertainty around what the prices will be in the future. This helps producers be able to commit time and resources in the current period by being able to reduce uncertainties regarding future time periods.
    - Investors participate in futures markets for a number of reasons including: a desire to create financial exposures in their portfolios to whatever the underlying asset is, a desire to speculate in certain assets, a desire to hedge certain outcomes, etc.
12. What types of assets are covered by futures contracts?
    - See the lecture on futures. There are many different types of underlying assets in the futures market.
13. How do daily settlements affect margin accounts?
    - See the numerical example and explanation in the lecture on futures
14. What is the convergence property?
    - The futures price will converge with the spot price at maturity
15. What is a futures curve? What is backwardation? Contango? Roll yield?
    - There are often multiple futures contracts trading on the same underlying asset. Some of these contracts mature within 1 month, some within 2 months, some within 3 months, etc. If you plot the futures prices for these contracts over time with the futures price on the vertical axis and the time-until-maturity on the horizontal axis you will trace out a futures curve.
    - The shape of the curve can be upward sloping (meaning longer-term futures prices are higher than current spot prices) or downward sloping (meaning longer-term futures prices are lower than current spot prices).
    - Upward sloping futures curves are in "contango" and have negative roll yields. As an example, assume you want to create a financial exposure to wheat in your portfolio so you buy a 6-month futures contract in wheat. For a few months you will have the financial exposure you wanted but over time the remaining time-until-maturity will shrink as the maturity date approaches and at some point you will need to exit your old wheat futures contract and then roll the money into a

new long-term futures contract if you desire to maintain a financial exposure to wheat. If the futures curve is upward sloping, then you end up selling the near-maturity contracts at low prices and then rolling the money into more expensive long-term contracts. This negative roll yield diminishes your returns.
    - Downward sloping futures curves are in "backwardation" and have a positive roll yield that can help your returns.
16. What is the VIX? How is it used?
    - The VIX provides information about volatility and fear in the market (see the lecture notes for a more precise description). People trade futures contracts based on the VIX to either speculate in or hedge against future volatility/fear in the market.
17. What are some differences between closed-end and open-end funds?
    - Open-end funds ("mutual funds") are generally sold at the NAV to sponsor. Closed-end funds can be sold at a premium or at a discount to NAV to other investors. In closed-end funds the fund companies issue a fixed number of shares that are traded.
18. How do you calculate a fund's NAV?
    - NAV = (market value of fund assets – liabilities)/(shares outstanding)
19. What types of fees are associated with mutual funds?
    - See the lecture on funds for a description of the various fees
20. Can you calculate the overall return to a fund that has these types of fees?
    - There are numerical examples in the lecture. The general formula is

$$Gross\ Return = (1-f)(1+r-a)^{n}(1-b)$$

21. What are some advantages and disadvantages of investing in funds?
    - Some advantages: Funds provide a relatively easy way to obtain a diversified portfolio, they provide nice record keeping for tax purposes, and funds are a relatively affordable way to be able to invest in a particular strategy if you can find a fund that has a strategy that you are interested in.
    - Potential disadvantages: Some funds have higher fees, some funds tend to have a lot of turnover, some funds cause frequent tax events for investors even if not all the investors are selling their own shares.
22. Why do some people sometimes prefer to invest in ETFs instead of mutual funds?
    - ETFs often have lower fees. (In recent years many mutual funds have also adopted lower fees but there are still many mutual funds with relatively high fees.)
    - ETFs can sometimes be sold short.
    - ETFs on public exchanges can be bought and sold during the day like stocks.
23. How do mutual fund vs hedge fund investment strategies differ? How do mutual funds and hedge funds differ in terms of transparency, oversight, investors, liquidity, compensation structure.
    - See comparison of mutual funds and hedge funds in the lecture on funds

Conceptual Questions for Module 7 (Business Cycles, Inflation, Efficient Markets)

1. What are business cycles?
    - Business cycles are multi-year cycles of expansion and contraction in the aggregate economy. There have been multi-year contractions in each of the

recent decades. The business cycle terminology includes peak, contraction, trough, expansion.

2. What happens to most firm valuations during a contraction?
    - Stock market movements are not perfect reflections of the business cycle but they do tend to generally mirror changes in overall economic activity.
    - During economic contractions the aggregate valuations of the firms in the stock indices tend to decrease and during expansions the aggregate valuations of the firms in the indices tend to increase.
3. What does a beta of 1.4 mean and how would it relate to the intuition of a business cycle?
    - Stock market movements are not perfect reflections of business cycles but they do tend to generally mirror changes in overall economic activity. If a firm's beta is 1.4 this means that when the stock market is up 1%, this firm, on average, is up 1.4% and when the market is down 1% this firm, on average, is down 1.4%. To the extent that the stock market mirrors overall economy cycles, this would suggest that firms with large betas tend to lose more value during economic contractions than firms with smaller betas.
    - The formula for the beta includes the covariance of the firm's excess returns with the market excess returns. The higher the covariance the higher the beta will be.
4. What kinds of firms tend to have higher betas? I.e., what kinds of firms tend to lose more value during contractions? (Note that the list of characteristics below are generalizations and may not apply in every case.)
    - Firms with the following characteristics tend to have higher betas: smaller firms, less-established or younger firms, firms with higher leverage, firms that sell mostly discretionary items
5. When do most bankruptcies occur? What does this suggest about the risk of investing in junk bonds or in the equity of firms with junk bonds?
    - Most bankruptcies occur during periods of economic contraction or during troughs in the business cycle. Low credit ratings signal higher default risk. The probability of a firm with a junk bond going bankrupt is higher than for a firm with an investment grade bond and this probability spikes during contraction/trough years. This suggests the risk of losing money in bond and/or equity investments in firms with poor credit ratings is higher in contraction/trough years.
6. When do interest rates generally rise? When do they fall? What implications does this have for investments in bonds?
    - The central bank tends to cut interest rates during recessions to try to stimulate the economy. The central bank tends to increase rates when economic conditions are strong.
    - Bond prices move in the opposite direction as interest rate changes. This means bond prices fall (rise) when interest rates increase (decrease).
7. What is the intuition behind sector rotation?
    - Using past data, investors can identify which industries have done well in the past during different parts of the business cycle. If you assume that the same types of firms/industries will do well during that same stage of future business cycles then you can adjust your portfolio to favor specific industries during different parts of the business cycle.

- This approach would not work if either (1) industries react differently to future cycles than they did in the past, and/or (2) investors misidentify where they are in the current cycle. For example, some recessions are longer than others and it is not always clear when the current cycle has reached the bottom or top of the cycle.

8. How can investors form an opinion about where we are in the current business cycle?
    - Leading economic indicators tend to move in advance of major changes in the business cycle.
    - The Conference Board provides an index of the leading economic indicators that is updated frequently.
9. One of the leading indicators is the slope of the yield curve. Why do investors focus on inverted yield curves?
    - Historically, in the US, there has been an inverted yield curve in the months/years leading up to each recession in the past 50+ years.
10. What is the CPI? How is it used to measure inflation?
    - The CPI tracks the aggregate price of a set of goods. It was standardized to have a level of 100 in 1983.
    - Inflation is measured as the percent change in the CPI index.
11. What is the Fisher equation?
    - (1+ nominal rate) = (1 + real rate)*(1 + inflation rate)
12. The Fisher equation has 3 rates. Given 2 of them can you solve for the 3rd? Can you inflate the price of something overtime?
    - See numerical examples in the lecture on business cycles and in the homework.
13. What does it mean if someone claims that “prices are generally efficient”?
    - Security prices are “efficient” in that they already reflect information. An informationally efficient market is one in which information is rapidly disseminated and reflected in prices.
14. If prices are generally efficient, then what does this imply about using current information to predict future price changes?
    - If public information is already reflected in the current price, then that same public information should not help in predicting future price changes. Essentially, if prices are efficient, then it is difficult to predict future price changes.
15. Does the efficient market’s hypothesis suggest that price *levels* are random?
    - No – the EMH suggest that current price levels are “information rich” in that they reflect the currently available information. The description of stock returns as following a “random walk” apply to price *changes* not price *levels*.
16. What is the difference between strong-form, semi strong-form, and weak-form categories of market efficiency? How do these ideas relate to technical analysis? Fundamental analysis?
    - See description in the lecture on market efficiency
17. What are some examples of “market anomalies”?
    - Market anomalies are patterns in stock price movements. They are interesting because if prices are efficient we would expect the patterns to disappear over time as profit-seeking investors try to exploit the patterns. Some patterns can persist if the gains from trading around the pattern are less than the cost of doing so.

- Two examples of the anomalies mentioned in lecture include the small firm effect and the post-earnings announcement drift.

18. In lecture we talked about clear evidence that stock prices are not completely strong-form efficient. What is that evidence?
    - Stock prices often react strongly to new announcements about earnings, management changes, fraud, mergers, etc. Those announcements are the point in time when information that has previously been private becomes public. The fact that the stock price reacts at the time of the announcement shows that the private information was not previously fully reflected in the price otherwise the stock price wouldn't react at the time of the announcement.
    - There is some evidence of stock prices moving a little in advance of announcements. This could be evidence of some private information getting into the price but the strong price reactions we observe at the time of announcements show that not all the private information is reflected in the price.
19. When in the day are most stocks generally traded?
    - A high volume of trades tends to occur soon after the market opens and soon before it closes.

Example Test Problems

1. Which one of the following statements regarding open-end mutual funds is false**?**

A. The funds redeem shares at net asset value.
B. The funds offer investors professional management.
C. The funds offer investors a guaranteed rate of return.
D. The funds redeem shares at net asset value and offer investors professional management.

Answer: C Mutual funds do not offer a guaranteed rate of return.

2. Multiple Mutual Funds had year-end assets of $457,000,000 and liabilities of $17,000,000. There were 24,300,000 shares in the fund at year end. What was Multiple Mutual's net asset value?

Answer: ($457,000,000 – 17,000,000)/24,300,000 = $18.11.

3. Closed-end funds are frequently issued at a _____ to NAV and subsequently trade at a _____ to NAV.

A. discount; discount
B. discount; premium
C. premium; premium
D. premium; discount
E. No consistent relationship has been observed.

Answer: D Closed-end funds are often issued at a premium to NAV and subsequently trade at a discount.

4. Management fees and other expenses of mutual funds may include

A. front-end loads.
B. back-end loads.
C. 12b-1 charges.
D. front-end and back-end loads.
E. front-end loads, back-end loads, and 12b-1 charges.

Answer: E All of the listed expenses may be included in the cost of owning a mutual fund.

5. A mutual fund had year-end assets of $465,000,000 and liabilities of $37,000,000. If the fund NAV was $56.12, how many shares must have been held in the fund?

Answer: ($465,000,000 – 37,000,000)/$56.12 = 7,626,515.

6. You purchased shares of a mutual fund at a price of $20 per share at the beginning of the year and paid a front-end load of 5.75%. If the securities in which the fund invested increased in value by 11% during the year, and the fund's expense ratio was 1.25%, your return if you sold the fund at the end of the year would be

Answer: {[$20 × 0.9425 × (1.11 – 0.0125)] –$20}/$20 = 3.44%.

7. You are considering an investment in a mutual fund with a 4% front-end load and an expense ratio of .5%. You can invest instead in a bank CD paying 6% interest a year. If you plan to invest for two years, what annual rate of return must the fund portfolio earn for you to be better off in the fund than in the CD?

Answer: After two years, each dollar invested in a fund with a 4% load and a portfolio return equal to r will grow to: $0.96 $\times$ $(1 + r – 0.005)^2$. Each dollar invested in the bank CD will grow to: $1 $\times$ $(1.06)^2$. If the mutual fund is to be the better investment, then the portfolio return, r, must satisfy:

$$0.96 \times (1 + r – 0.005)^2 > (1.06)^2$$
$$0.96 \times (1 + r – 0.005)^2 > 1.1236$$
$$(1 + r – 0.005)^2 > 1.1704$$
$$1 + r – 0.005 > 1.0819$$
$$1 + r > 1.0869$$

Therefore, r > 0.0869 = 8.69%

Name	Market Capitalization ($ million)	Enterprise Value ($ million)	P/E	Price/ Book	Enterprise Value/ Sales	Enterprise Value/ EBITDA
Gannet	6350	10,163	7.36	0.73	1.4	5.04
New York Times	2423	3472	18.09	2.64	1.10	7.21
McClatchy	675	3061	9.76	1.68	1.40	5.64
Media General	326	1192	14.89	0.39	1.31	7.65
Lee Enterprises	267	1724	6.55	0.82	1.57	6.65
Average			**11.33**	**1.25**	**1.35**	**6.44**

8. The table above shows the stock prices and multiples for a number of firms in the newspaper publishing industry. Another newspaper publishing firm (not shown in the table) had sales of $640 million, net income of $84 million, excess cash of $67 million, $14 million of debt, and 120 million shares outstanding in the last year. If the average enterprise value-to-sales ratio for the comparable businesses shown in the table is used, which of the following is the best estimate of share value for the other firm?

A) $7.08
B) $7.20
C) $7.64
D) $7.75

Answer: C
Explanation: Implied Enterprise Value using multiple = 1.35 × $640 = $864 million where the 1.35 is the average enterprise value-to-sales ratio from the table and 640 is the sales at the other firm.

Enterprise Value + cash = D + E where D and E are the market values of debt and equity.
Using algebra this equation can be rewritten as Enterprise Value + cash – D = E.
If we divide the market value of equity by the number of shares outstanding we can get a share estimate:

Share price estimate = E/number shares outstanding
Share price = ($864 million + $67 million - $14 million) / 120 million shares = $7.64

9. The stock price at a firm can be modeled as the present value of all future dividends. Assume that the correct discount rate is 12% and that the dividends will have no growth across time and be $7 each year. The next dividend is 1 year from today. What percent of the share price is attributable to the first 2 dividends?

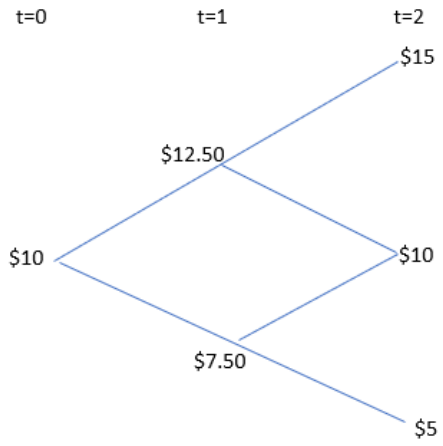
Answer: The no growth PV formula is PV = CF/r. This is the PV of all future dividends.

- The PV of the infinite series of dividends would be 7 / .12 = $58.333
- The PV of the first 2 dividends would be $7 / 1.12^1 + 7 / 1.12^2 = \$11.83$ using the TVM formula for moving cash flows to year 0 dollars. For example the $7 / 1.12^2$ part of the formula takes the $7 dividend in year 2 and converts it to year 0 dollars by dividing the dividend value by $(1+r)^2$.
- This means the first 2 dividends account for 11.83 / 58.333 = 20.28% of the share price.

10. Fresh Flowers Inc. (FFI) is expected to pay a $5.00 dividend at the end of this year. Assume you expect FFI's dividend to then grow in subsequent years by 3% each year forever and that FFI's equity cost of capital is 9% and its WACC is 8%. What is your best guess for what a share of FFI stock would be worth?

Answer: The share price can be modeled as the PV of the infinite series of future dividends. This series has a constant growth rate of 3%. The dividend in year 1 will be $5. The present value of a constant growth series is PV = $CF_1/(r-g)$. Because the cash flows are dividends, we would use the cost of equity as the discount rate and not the WACC. This means that PV = $CF_1/(r-g) = 5 / (.09 - .03) = \$83.33$.

11. You are thinking about buying a put option with a strike price of $10 which expires in 2 months. The underlying asset is currently valued at $10 and is expected to follow a binomial process with equal probability at each branching of the tree as shown below. For example, at time t=1 the underlying asset could be $12.50 or $7.50. What would be the payoff to the put option in t=2 for each of the 3 outcomes?



Answer: The binomial lattice above shows that the underlying asset's price can move up or down by $2.50 each month. According to this model the underlying asset could have a price of $15 at time = 2 (top outcome), $10 (middle outcome), or $5 (bottom outcome). If this were a call option then the payoff would be the underlying asset's price at t=2 (S_T in the lecture notes) minus the strike price (X in the lecture notes) if the call option is "in the money" and the payoff would be 0 otherwise. For a put option the payoff would be $X - S_T$ at t=2 if it is "in the money" and 0 otherwise. So in this example the top outcome would have a payoff of 0 because it is "out of the money", the middle outcome would have a payoff of 0, and the bottom outcome would have a payoff of 10 - 5 = $5.

12. Gonzales Corporation just reported its financials for the past year. In looking at those numbers the firm generated free cash flow of $86 million in the past year. For the upcoming two years, the company's free cash flow is expected to grow at a rate of 10%. After that time, the company's future free cash flows are expected to grow at the industry long-term growth rate of 4% per year. If the weighted average cost of capital is 11% and Gonzales Corporation has cash of $100 million, debt of $275 million, and 100 million shares outstanding, what is Gonzales Corporation's expected current share price?

A) $14.37
B) $11.87
C) $12.49
D) $16.24

Answer: C

Explanation: FCF in year 1: FCF_1 = \$86 million × (1 + 0.10) = \$94.6 million
FCF in year 2: FCF_2 = \$86 million ×$(1.10)^2$ = \$104.06 million
FCF in year 3: $FCF_{3.}$ = \$104.06 million × (1 + 0.04) = \$108.2224 million

The future FCFs starting in year 3 have constant growth each year and extend into the future as an infinite series. The cash flows in years 1 and 2 are not part of this constant growth series because they don't grow at the same rate.

So the strategy for this problem would be to calculate the PV of the first 2 cash flows separately and then to add this value to the PV of the infinite series that starts in year 3. So the logic is as follows:

Enterprise value = PV(FCF_1) + PV(FCF_2) + PV(infinite series starting in year 3).

The generic constant growth formula $PV_0 = CF_1/(r-g)$ requires that the first cash flow in the series be 1 year in the future relative to the PV. So to apply this same formula to the series that starts in year 3 we would need to place ourselves in year 2 such that the first CF in the constant growth series is 1 year in the future (i.e., in year 3) relative to year 2. This means that the present value in year 2 dollars of the infinite series that starts in year 3 would be equal to $PV_2 = CF_3/(r-g)$ = \$108.2224 million / (0.11 - 0.04) = \$1,546.03 million. We need to discount this from year 2 dollars to year 0 dollars.

Putting it all together:

Enterprise value = PV(FCF_1) + PV(FCF_2) + PV(infinite series starting in year 3)
Enterprise value = $94.6/1.11 + 104.06/1.11^2 + 1546.03/1.11^2$ = \$1,424.475

We can then use this Enterprise Value with the information on D and cash provided in the problem to solve for E. D is the market value of debt. E is the market value of equity.

Enterprise Value + cash = D + E ➔ enterprise value + cash – debt = equity
Using the numbers above this becomes 1424.475 + 100 – D = E

If we then divide E by number of shares outstanding we can get a per share estimate which is what the problem asked for. (1424.48 million - 275 million + 100 million) / 100 million = \$12.49