University of Richmond
Robins School of Business™

§13. Equity Valuation: Free Cash Flows and Comps

FIN 366: Investments

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DISCOUNTED CASH FLOW VALUATION

About 80% of firms in the S&P 500 (and about 50% of US stocks overall) pay dividends. Obviously, alternatives to the dividend discount model (DDM) method of stock valuation are necessary in cases when firms do not pay dividends. The DDM may also underestimate the intrinsic value of firms with low payout ratios paying dividends below their full capacity to do so.

Analogous to the DDM model, **discounted cash flow (DCF)** valuation takes the intrinsic value of a stock to be the present value of future cash flows to which shareholders are *theoretically* entitled. DCF valuation formulas take a similar form to the dividend discount model:

$$V_0 = \frac{CF_t}{(1+r)^t} + \cdots + \frac{CF_N + Terminal\ Value_N}{(1+r)^N}$$

where

$$CF = Cash\ Flow$$

$$r = Discount\ Rate$$

$$g = Growth\ Rate$$

$$Terminal\ Value_N = \frac{CF_{N+1}}{r-g} \quad or \quad EBITDA_N \times \frac{EV}{EBITDA} Exit\ Multiple$$

The DCF approaches we explore are known as the **free cash flow to the firm (FCFF)** and **free cash flow to equity holders (FCFE)** models. These models differ in their cash flows *CF* and discount rates *r*.

The **Terminal Value** is the constant growth portion in the final period, discounted back with the forecasted cash flow of the last period. In practice, analysts often forecast about 5 years, then assume some constant growth. Alternatively, the terminal value can be found by a multiple method.

We consider first the difference in cash flows, then discount rates.

CASH FLOWS

We consider three possible cash flows to which investors are entitled: (1) dividends, (2) free cash flows to the firm, and (3) free cash flows to equity holders.

Table 1: Discounted Cash Flow Models

DDM	FCFF	FCFE
Dividends	$FCFF =$ $EBIT(1 - t_c)$ $+ Depreciation\ and\ Amort.\ Exp$ $- Capital\ Expenditures$ $- \Delta Net\ Working\ Capital$	$FCFE =$ $FCFF$ $- Interest\ Expense(1 - t_c)$ $+\Delta\ Net\ Debt$

To obtain the free cash flows to the firm, cash flows to which *both* equity and debt holders have a claim:

FCFF: Free Cash Flows to the Firm

1. Obtain the firm's earnings before interest and taxes (EBIT), and tax it
2. Add back the non-cash depreciation and amortization expense
3. Subtract expenditures on property, plants, buildings, equipment, etc.
4. Subtract change in *non-cash* net working capital (NWC = CA – CL, an increase is a cash outflow: paying to acquire assets and paying off current liabilities)

FCFF is also known as **unlevered free cash flows** because it is the cash flow the firm generates and available to *both* equity and debtholders.

To determine only those cash flows to which *equity* holders have a claim:

FCFE: Free Cash Flows to Equity Holders

1. Begin with FCFF
2. Subtract payments on debt after taxes[1]
3. Add the change in net debt, where net debt in a period is the sum of long term and short-term debt and leases minus the cash and equivalents for that period.

FCFE is also known as **levered free cash flows** because it is the cash flow the firm generates and is available to *only* equity holders *after* the effects of borrowing (leverage) are considered.

Discount Rates

The cash flows in each of these models must be discounted at a rate that reflects the risk associated with the cash flow.

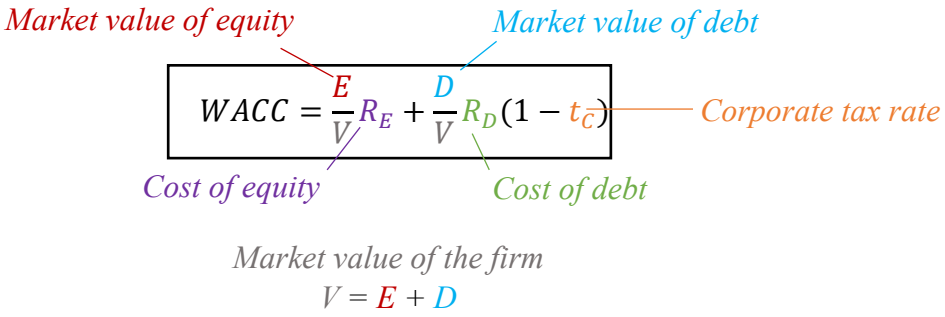
> ⚠ The model cash flows must *always* be paired with their appropriate discount rate.

Table 2: Discounted Cash Flow Models

DDM	FCFF	FCFE
Required Rate of Return	WACC	Cost of Equity
$k = r_f + \beta[E(R_M) - r_f]$	$WACC = \frac{E}{V}R_E + \frac{D}{V}R_D(1 - t_C)$	$k_E = r_f + \beta_L^*[E(R_M) - r_f]$

FCFF Discount Rate: The WACC

The free cash flows to the firm represents cash flows to *both* equity holders and debt holders – both suppliers of capital on the balance sheet. Therefore, the appropriate discount rate in this case is the weighted average rate of return required by both debt and equity holders. This weighted average is known as the **Weighted Average Cost of Capital (WACC)**.



The WACC represents a blended required rate of return that holders of firm debt and equity require given the riskiness of the company. The cost of equity, as a riskier residual claim, should be greater than the cost of debt.

Think of the "required return" of a debt or equity investor as a "cost" of equity or debt to the firm. It is what the investors expect to be compensated for bearing risk.

Market value of equity E is the number of shares outstanding times the price per share, also known as the **market capitalization** or **market cap**. The market value of debt is the market value of all the company's outstanding debt.[2] E/V and D/V are referred to as **equity-to-cap** and **debt-to-cap**.

For the *costs* of equity and debt:

1. Cost of Debt R_D: average yield on the company's bonds and debt
2. Cost of Equity R_E: the required rate of return formula

$$R_E = k_E = r_f + \beta_L^* \left[E(R_M) - r_f \right]$$

with a modified beta, now β_L^*:

$$\beta_L^* = \underbrace{\frac{\beta}{1 + \left(\frac{D_{actual}}{E_{actual}}\right)(1 - t_c)}}_{\text{Unlevering}} \times \underbrace{\left[1 + \left(\frac{D_{Forecast}}{E_{Forecast}}\right)(1 - t_c)\right]}_{\text{Relevering}}$$

β_L^* is an **unlevered** then **relevered beta**. Suppose a firm is increasing its debt. Doing so increases the firm's risk and possibly its return potential, but this risk is not necessarily due to *market risk*.

First, the beta based on the stock's exposure to the market (from the index model regression and available on financial data websites) is "unlevered." This removes any beneficial or detrimental effects gained by the firm's own choice of changing the capital structure (mix of debt and equity).

Then, the beta is "relevered" using a forecast capital structure to reintroduce financial risk. Often, an industry average is used for the forecast D/E. In corporate acquisitions, it may be the D/E of the acquired firm.

FCFE Discount Rate: The Cost of Equity

The discount rate for the FCFE model is the required rate of return k_E, which uses the same required rate of return formula by the CAPM, but with the new relevered beta.

PRACTICE: Determine the FCFF and FCFE for this firm in the current year. Compute the appropriate discount rate for each type of cash flow. Assume the stock has a beta of 0.59, a D/E ratio of 162%, a forecast D/E ratio of 100%, the expected return of the market is 12%, the risk-free rate is 4%, the debt-to-cap ratio is 62%, and the cost of debt (the yield on the company's debt) is 5%.

Income Statement Items	**Previous Year**	**This Year**
Revenue	$ 43,004.0	$ 45,754.0
Cost of Revenues	18,000.0	18,520.0
Gross Profit	25,004.0	27,234.0
Operating Expenses	12,664.0	13,921.0
Operating Income or EBIT	12,340.0	13,313.0
Other Expenses (Gains)	361.0	(62.0)
Net Interest Expense (Income)	322.0	412.0
Income Tax Expense	2,115.0	2,249.0
Net Income	$ 9,542.0	$ 10,714.0

Statement of Cash Flow Items	**Previous Year**	**This Year**
Depreciation and Amortization	1,260.0	1,128.0
Capital Expenditures	1,484.0	1,852.0

Balance Sheet Items	**Previous Year**	**This Year**
Total Current Assets	22,591.0	26,732.0
Cash and Equivalents	11,631.0	13,663.0
Accounts payable	5,307.0	5,590.0
Accrued expenses	8,937.0	8,524.0
Other current non-debt liabilities	1,164.0	1,005.0
Debt and Leases - LT, ST, and Current	42,279.0	44,544.0

Other Items	**Previous Year**	**This Year**
Marginal Tax Rate	21.0%	21.0%
Dividends per Share	$1.76	$1.84

SOLUTION: Beginning with FCFF:

$$FCFF = EBIT(1 - t_c) + Depreciation\ \&\ Amortization - Capital\ Expenditures - \Delta\ Net\ Working\ Capital$$

Then, FCFE:

$$FCFE = FCFF - Interest\ Expense(1 - t_c) + \Delta\ Net\ Debt$$

For FCFF, the appropriate discount rate is the _____. For the FCFE, the appropriate discount rate is the _____. We begin with the cost of equity by unlevering and relevering beta at the forecast capital structure:

Unlevering beta:

$$\frac{\beta}{1+\left(\frac{D_{actual}}{E_{actual}}\right)(1-t_c)} =$$

Relevering beta:

$$\times \quad \left[1+\left(\frac{D_{Forecast}}{E_{Forecast}}\right)(1-t_c)\right] =$$

The cost of equity is:

$$R_E = k_E = r_f + \beta_L^*\left[E(R_M) - r_f\right] =$$

And the WACC:

$$WACC = \frac{E}{V}R_E + \frac{D}{V}R_D(1 - t_C) =$$

INTERPRETATION: The cash flows must be paired with their appropriate discount rate. Now that we have this firm's FCFF and FCFE, we will forecast these cash flows into the future and discount these cash flows accordingly.

FORECASTING FREE CASH FLOWS

In equity valuation, analysts compute a firm's free cash flows for the preceding 5 to 10 years using actual data. Then, they estimate future free cash flows by individually forecasting the line-item components of the free cash flows. This generally entails forecasting revenue at a near-term growth rate based on historical averages for the subsequent 3-5 years, and "building out" the **pro forma** financial statements.

Line items are often kept at a percentage of sales or of assets that is near historical averages, or at a percentage of sales or of assets that reflects an analyst's opinion of the future growth potential of the firm.

View the Excel file *DCF Model* available at josephfarizo.com/fin366.html for an example of a DCF model.

DETERMINING THE PRESENT VALUE

FCFF Methods: Perpetual Growth and Exit Multiple

Revisiting the present value formula:

$$V_0 = \frac{CF_t}{(1+r)^t} + \cdots + \frac{CF_N + Terminal\ Value_N}{(1+r)^N}$$

We can find the value of the shares by the **terminal growth** or **perpetual growth method**:

$$V_0 = \frac{FCFF_t}{(1+WACC)^t} + \cdots + \frac{FCFF_N + \frac{FCFF_{N+1}}{WACC - g}}{(1+WACC)^N}$$

where

$$FCFF_{N+1} = FCFF_N \times (1+g)$$

This method estimates the value of the firm, based on the cash flows to which both debtholders and equity holders are entitled. Once you determine V_0, you must (1) *subtract the value of the firm's debt from V_0* and (2) *divide by the shares outstanding* to determine the value of a share.

Alternatively, the **exit multiple method** is:

$$V_0 = \frac{FCFF_t}{(1+WACC)^t} + \cdots + \frac{FCFF_N + EBITDA_N \times Exit\ Multiple}{(1+WACC)^N}$$

Here, the terminal value is the forecasted earnings before interest, taxes, depreciation, and amortization **EBITDA** multiplied by an **exit multiple**. The exit multiple is a forecast of what the firm will trade at relative to its **enterprise value (EV)**, a measure of the firm's total value which is more comprehensive than the equity value (or market capitalization) alone. It is used to proxy for the cost of acquiring the entire firm.

$$Enterprise\ Value = Market\ Cap + Net\ Debt + Preferred\ Equity + Noncontrolling\ Interest - Cash\ \&\ Equiv.$$

You can determine a firm's **EV/EBITDA** multiple by dividing these two values. In a DCF, we can forecast an **exit multiple** or what the firm's EV/EBITDA will be in the future, then multiply this multiple by that year's forecast EBITDA to use as the terminal value in the DCF. Average industry trading multiples are useful for context.

You can lookup up a firm's EV, as well as the other inputs for the DCF model, at S&P NetAdvantage. Aswath Damodaran's website includes target D/E ratios and exit multiple calculations.

FCFE Methods: Perpetual Growth

By the FCFE model:

$$V_0 = \frac{FCFE_t}{(1+k_E)^t} + \cdots + \frac{FCFE_N + \frac{FCFE_{N+1}}{k_E - g}}{(1+k_E)^N}$$

Given these cash flows are to the equity holders alone, simply divide V_0 by the number of shares to determine the per-share value.

PRACTICE: You forecast the FCFF and FCFE as indicated in the table below from your pro forma financial statements. Determine the present value of these cash flows and the value of equity shares of the firm by the (1) FCFF (terminal growth method), (2) FCFF (multiple method), and (3) FCFE method. Use the discount rates from the previous example. The forecast exit multiple in the terminal year is 18, and the EBITDA in the terminal year is forecast to be $19,593.3. Assume a terminal growth rate of 2% and 4,323 shares outstanding.

	t+1	t+2	t+3	t+4	t+5
FCFF	$11,779.6	$11,021.9	$ 11,683.2	$12,384.2	$13,127.2
FCFE	$16,264.2	$12,377.5	$13,120.2	$13,907.4	$14,741.8

SOLUTION: Beginning with the FCFF with perpetual growth:

$$V_0 = \frac{FCFF_t}{(1+WACC)^t} + \cdots + \frac{FCFF_N + \frac{FCFF_{N+1}}{WACC - g}}{(1+WACC)^N}$$

We find V_0, subtract the value of debt, and divide by the number of shares outstanding. The value per share is about **$72**.

Then FCFF with the exit multiple:

$$V_0 = \frac{FCFF_t}{(1+WACC)^t} + \cdots + \frac{FCFF_N + EBITDA_N \times Exit\ Multiple}{(1+WACC)^N}$$

We find V_0, subtract the value of debt, and divide by the number of shares outstanding. The value per share is about **$64**.

And finally, by the FCFE method:

$$V_0 = \frac{FCFE_t}{(1+k_E)^t} + \cdots + \frac{FCFE_N + \frac{FCFE_{N+1}}{k_E - g}}{(1+k_E)^N}$$

We find V_0 and divide by the number of shares outstanding. The value per share is about **$53**.

INTERPRETATION: The values per share usually differ when using different methods. Investors and analysts should compute all methods to get a more complete picture. The **premium to current** $[(estimate - price)/price]$ represents the potential capital gain (or loss) opportunity. If, for example, the stock trades at $50, the premium to current by the FCFE method would be +6.0% ($53 is 6% greater than $50). If the stock trades at $60, the premium to current by the FCFE method would be -11.67% ($53 is 11.67% less than $60).

Sensitivity Analysis

Changing discount rates, betas, target capital structure, growth rates, and other inputs by even modest amounts can have large effects on the estimate of the intrinsic value. Any computation of an intrinsic value should include **sensitivity analysis**. Adjust growth rates, discount rates, and exit multiples to determine the effects it has on the valuation.

DCFs are *highly sensitive* to inputs. Vary growth rates and discount rates to observe how valuations change.

Figure 1: Sensitivity Analysis

Sensitivity Table

WACC \ Terminal Growth Rate	1.50%	1.75%	2.00%	2.25%	2.50%
5.09%	$68.58	$73.77	$79.79	$86.87	$95.32
5.59%	$58.86	$62.74	$67.17	$72.26	$78.17
6.09%	$51.25	$54.26	$57.63	$61.44	$65.79
6.59%	$45.14	$47.53	$50.17	$53.12	$56.43
7.09%	$40.13	$42.06	$44.18	$46.52	$49.12

Notice higher growth rates (and exit multiples) *increase* the estimate of the stock's intrinsic value while higher discount rates *reduce* the estimate of the stock's intrinsic value.

Another approach to valuation is to set the intrinsic value equal to the stock's price. Then, examine the implied growth rates and discount rates to observe the implied inputs that are necessary to justify the price.

Compute valuations by multiple methods, varying the inputs for each method, and compare.

RELATIVE VALUATION

Another approach to valuation is to compare a firm's stock price to similar firms or the industry and market overall to get a valuation by comparison. In what way is a stock favorable relative to its competitors, peers, and its industry? This is known as **relative valuation** or **valuation by comps**.

Commonly used ratios generally include some measure of price (or market value) relative to some measure of fundamental value. Analysts look at industry averages or medians of a number of ratios, then use these ratios to compute an **implied price** of the stock they seek to value. A low price or market value relative to a measure of fundamental value implies the stock is comparatively at an attractive price, or is trading at a value (as opposed to growth stocks, which trade with higher ratios.)

Popular ratios include:

- **Price to earnings** (**P/E**), both **trailing** and **forward**
- **Price/earnings to growth** (**PEG**)
- **Price to sales** (**P/S**) and **Price to book** (**P/B**) **value of equity**

P/E ratios may be **trailing** using the current stock price divided by the EPS over the previous 12 months, or **forward** using the current stock price divided by the company's predicted EPS for the next 12 months. Unless otherwise specified, the P/E ratio is usually TTM (trailing twelve months). Trailing suffers from being backward-looking, but forward relies on assumptions.

The **price/earnings to growth (PEG) ratio** divides the P/E ratio by forecasted earnings growth. For example, a firm with a P/E of 20 and expected earnings growth of 10% has a PEG of 2. A PEG below 1 is often the benchmark for being undervalued, though a firm's PEG should be compared to industry peers.

$$PEG = \frac{\frac{Price}{EPS}}{Expected\ Earnings\ Growth\ Rate \times 100}$$

To compute an implied price, set the ratio equal to an industry or peer group average or median, input the firm's own fundamental values, and solve for "P."

EXAMPLE: A firm is in an industry with an average PEG of 2. The firm itself has an EPS of $3, and expected EPS growth of 6%. To determine its implied price:

$$PEG = \frac{\frac{Price}{EPS}}{Expected\ Earnings\ Growth\ Rate \times 100}$$

$$2 = \frac{\frac{Price}{3}}{0.06 \times 100} \rightarrow Price = \$36$$

As in free cash flow valuation, estimates of prices and intrinsic values vary across techniques. Analysts compute implied prices and compare the premium to current for each. Identifying peer groups, however, can be challenging given the unique features of firms.

Figure 2: Valuation by Comps

	Trailing PE	Forward PE	PEG	P/S	P/B
Company A	17.85	20.85	2.939	7.74	8.05
Company B	15.61	14.61	3.749	5.37	8.4
Company C	18.92	15.92	2.077	5.39	8.95
Company D	19.5	16.5	3.724	7.73	9.52
Average	17.97	16.97	3.12	6.56	8.73
	EPS	EPS	EPS Growth	Revenue	BV of Equity
Firm (per share values)	$3.50	$3.50	5.5%	$9.05	$6.00
Implied Prices	$62.90	$59.40	$60.10	$59.35	$52.38
Actual Stock Price	$58.77	$58.77	$58.77	$58.77	$58.77
Premium to current	7.0%	1.1%	2.3%	1.0%	-10.9%

⚠ Generally, analysts do not use DCF approaches to value financial firms given the volatility of their cash flows, leverage, and strict regulatory environment. Use either the DDM or P/B ratios (as well as other ratios – but avoid ratios that use cash flows or profits).

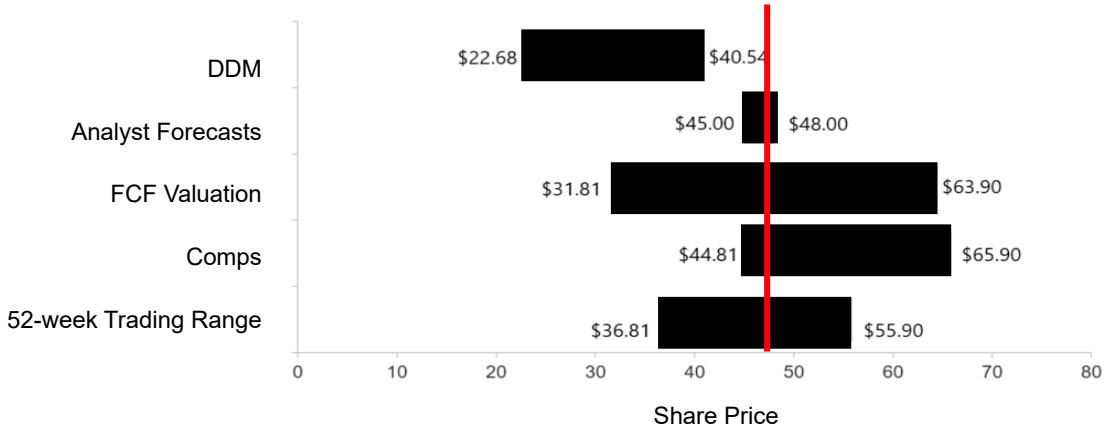
VALUATION: IN CONCLUSION

Valuation is an art, not a science. Different approaches have different results. A stock may appear to be undervalued in one method but overvalued by another.

When possible, estimate an intrinsic value by *all* methods. However, certain methods perform better in certain instances:

1. DDM is preferred for modest-growth mature firms with a history of dividend payments, high dividend payout ratios, utilities, financial firms, MLPs, and REITS. The DDM may often underestimate intrinsic values if dividend payout ratios are low.
2. FCFF is useful for firms with very high or very low leverage, or when leverage is expected to change. This often includes high-growth firms.
3. FCFE is useful for firms with stable leverage.
4. Comp analysis is useful in most cases when a suitable peer group can be identified, though ratios with profitability measures (i.e., earnings, EPS, EPS growth) should generally be avoided for financial firms. Relative valuation is also important for firms with unsteady or unpredictable revenue streams and cash flow, where FCFF and FCFE may be difficult.

Figure 3: Football Field Analysis



Think *qualitatively.* What are the prospects of the firm? Does it have a competitive advantage? Is the stock correlated or uncorrelated with your current holdings?

Have an **investment thesis**, or a rationale as to why a stock is an attractive investment. What would make it a worthy part of your portfolio based on your research into the growth potential, portfolio fit, quality, and value?

Valuation techniques are just a tool and do not replace a good investment thesis. Attractive valuations alone do not substitute for a quality business model, favorable competitive environment, and good prospects.

CRITICAL THINKING QUESTIONS

1. Why do we add back the depreciation and amortization when calculating the free cash flow to equity holders?
2. Explain why an increase in net working capital is considered a cash outflow.
3. Describe the relationship between FCFF and FCFE. How do you get from one to the other?
4. Why do we discount cash flows and not profitability measures (like net income or earnings per share) to determine an estimate of the intrinsic value of a share?
5. What are the discount rates associated with the DDM, FCFF, and FCFE methods? Why do they have different discount rates and why is it important that the discount rates be matched to their appropriate cash flows?
6. Explain how a "cost" of equity or debt to the firm is the same as a "required return" on equity or debt to an investor.
7. What do we use for a firm's cost of debt?
8. How do analysts arrive at forecasts for FCFF and FCFE? When they build their pro forma model, how do they normally check if their estimates are "in line" with what is reasonable?
9. Describe the WACC and how it represents a "blended" cost of capital to the firm. Why is it important that multiple costs of capital be considered?
10. An analyst mistakenly discounts their forecasted FCFFs using the cost of equity. Explain why this will result in their intrinsic value estimate being lower than it should.
11. Is the cost of equity or the cost of debt usually higher for a firm? Why?
12. Why do we multiply the cost of debt, EBIT, and interest expense by $(1 - t_C)$?
13. Growth stock ratios generally imply a high price relative to firm fundamentals. Why might an investor be comfortable with paying a high price given a firm's low fundamental value(s)?
14. Explain why the computations from DCFs and the DDM technically result in *intrinsic value estimates* but not the actual *intrinsic value* of a firm.
15. All else equal, what happens (and *why*) to the intrinsic value estimate of a stock if:
    a. WACC increases
    b. Beta increases
    c. The firm's terminal growth rate increases
    d. The firm's cost of debt increases
    e. Forecast FCFE or FCFF increases
    f. Terminal EBITDA increases
    g. Higher exit multiple
16. Explain the unlevering/relevering beta process and why it is necessary in order to obtain the cost of equity.
17. Under what circumstances will unlevering/relevering beta be most important for valuation?
18. Does the beta normally increase or decrease when we unlever? Why?
19. If the industry debt-to-equity ratio you use to relever a stock's unlevered beta is *higher* than the firm's actual debt-to-equity ratio, do we expect the stock's relevered beta to be *higher or lower* than the stock's original beta?
20. Several ratios consider "book" values in their computation. What is "book" value and how does it differ from the "market" value?

21. How do we determine if a ratio or valuation measure is at an acceptable or reasonable level for a firm?
22. On which financial statement (balance sheet, income statement, or statement of cash flow) do we find the following inputs for FCFE and FCFF?
    a. EBIT
    b. Depreciation
    c. Capital expenditures
    d. Net working capital
    e. Debt
23. Explain the pros and cons of the TTM P/E and forward P/E. When might using one be better than using the other?
24. A firm's forward PE is lower than its trailing PE. What does this imply?
25. Why is it important to consider the industry or competitors when evaluating a stock's P/E ratio and other ratios?
26. How does an investor use ratios to compute an implied price for a firm? How might an investor use this implied price to make an investing decision?
27. Describe some challenges associated with choosing "comparable" firms. What are some ways in which we can determine if a firm is comparable to another?
28. What causes there to be "ranges" of intrinsic value estimates in a football field analysis? How does an analyst go about producing these ranges? How would one know what is a reasonable range?
29. Describe how an investor might "work backwards" when conducting a DCF to determine if a stock is over or under valued.
30. While an investor should estimate the intrinsic value of a share by DDM, FCFE, FCFF, and comps, explain in which cases each method produces the better estimates.
31. You identify a stock that is undervalued by all metrics. Why might you *not* add this stock to your portfolio? Assume your calculations and inputs are all correct.
32. CHALLENGE We can estimate the intrinsic value of shares using the DDM, FCFE, FCFF, and comps at a given time, yet stock prices move continuously throughout the day. Why might this be the case? How does this relate to sensitivity analysis?
33. CHALLENGE FCFE represents the cash flow to equity holders while FCFF represents cash flows to the entire firm. How is it possible for the FCFE to be *bigger* than FCFF?
34. CHALLENGE A firm's **liquidation value** is the that could be achieved if the firm immediately ceased operations and all assets were sold off to pay debt holders, then shareholders. How might this value represent a "floor" of the stock's price (assuming all debt holders can be paid)? What might an investor do if they determine a firm's shares are trading below a liquidation value?
35. CHALLENGE Perhaps the most famous investment banking interview question is "walk me through the steps in conducting a DCF analysis." Therefore, *walk me through the steps in conducting a DCF analysis*, from the computation of the cash flows to the use of the appropriate discount rate.

ANALYTICAL QUESTIONS

1. An analyst produces the following model and estimates the intrinsic value of the shares of the firm by the FCFF method. You are highly skeptical of their findings. Explain why. Are their FCFFs likely to be over or understated? Do you think your friend determined that the shares were under or overvalued?

Income Statement Items	T	Estimates T+1	T+2	T+3
Revenue	$ 45,754.0	$ 49,871.9	$ 55,856.5	$ 65,910.7
% YOY Growth Rate	*6.4%*	*9.0%*	*12.0%*	*18.0%*
Cost of Revenues	18,520.0	1,888.0	1,566.0	1,899.0
% of Revenues	*40.5%*	*3.8%*	*2.8%*	*2.9%*
Gross Profit	27,234.0	47,983.9	54,290.5	64,011.7
% Gross Margin	*59.5%*	*96.2%*	*97.2%*	*97.1%*
Operating Expenses	13,921.0	14,961.6	16,756.9	19,773.2
% of Revenues	*30.4%*	*30.0%*	*30.0%*	*30.0%*
Operating Income or EBIT	13,313.0	33,022.3	37,533.5	44,238.5
% Operating Profit Margin	*29.1%*	*66.2%*	*67.2%*	*67.1%*
Other Expenses (Gains)	(62.0)	6,040.9	3,998.9	3,403.4
% of Revenues	*-0.2%*	*12.6%*	*7.4%*	*5.3%*
Net Interest Expense (Income)	412.0	300.0	300.0	300.0
% of Revenues	*0.9%*	*0.6%*	*0.5%*	*0.5%*
Income Tax Expense	2,249.0	2,743.0	3,072.1	3,625.1
% of Revenues	*4.9%*	*5.5%*	*5.5%*	*5.5%*
Effective Tax Rate	*17.3%*	*10.3%*	*9.2%*	*8.9%*
Net Income	$ 10,714.0	$ 23,938.5	$ 30,162.5	$ 36,910.0
% Net Profit Margin	*23.4%*	*48.0%*	*54.0%*	*56.0%*

2. Use the information in this sensitivity table to answer the questions that follow.

Sensitivity Table

Cost of Equity	Terminal Growth Rate 1.50%	1.75%	2.00%	2.25%	2.50%
14.31%	*$36.02*	*$36.47*	*$36.93*	*$37.42*	*$37.92*
14.81%	*$34.67*	*$35.08*	*$35.50*	*$35.94*	*$36.40*
15.31%	*$33.41*	*$33.79*	*$34.17*	*$34.57*	*$34.99*
15.81%	*$32.25*	*$32.59*	*$32.94*	*$33.31*	*$33.68*
16.31%	*$31.16*	*$31.47*	*$31.80*	*$32.13*	*$32.48*

   a. Which method (FCFF or FCFE) was used to compute these values, and how do you know?
   b. You are certain that the cost of equity is 14.31% and that the FCFs are appropriately calculated and forecasted. Explain why an intrinsic value per share of $40 is unreasonable.
   c. If you wanted to be *most conservative* in your estimate, which value from the table would you use as your estimate of the intrinsic value, and why?
   d. What is the premium to current if the shares are trading at $30, and you use a terminal growth rate of 2% and a cost of equity of 15.31%? What if the shares are trading at $39?

3. Use the valuation by comps analysis below to answer the questions that follow.

	Trailing PE	Forward PE	PEG	P/S	P/B
Company A	17.85	20.85	2.939	7.74	8.05
Company B	15.61	14.61	3.749	5.37	8.4
Company C	18.92	15.92	2.077	5.39	8.95
Company D	19.5	16.5	3.724	7.73	9.52
Average	17.97	16.97	3.12	6.56	8.73
	EPS	EPS	EPS Growth	Revenue	BV of Equity
Firm (per share values)	$3.50	$3.50	5.5%	$9.05	$6.00
Implied Prices	$62.90	$59.40	$60.10	$59.35	$52.38
Actual Stock Price	$58.77	$58.77	$58.77	$58.77	$58.77
Premium to current	7.0%	1.1%	2.3%	1.0%	-10.9%

a. Show how each of the implied prices in the table is obtained using the firm's per-share values given (note you may have some small rounding errors).
b. Show that you can compute the premium to current in each case.
c. You discover that the analyst produced this table for a group of banks. Which valuation metric from their list should they use, and what would be your opinion as to whether the shares are over or undervalued?

CFA QUESTIONS

Answers are in the *Notes & References* section below.[3]

1. An analyst forecasts free cash flows to equity holders (FCFE) of $1,000 next year, and they forecast these FCFEs will grow at 8% for the subsequent 2 years. After that, she expects FCFE to grow at 1.5% indefinitely. The cost of equity is 7%, and the WACC is 4%. What is the value per share if there are 1,000 shares?
    a. $22.13
    b. $19.18
    c. $20.40
2. Which of the following might explain why a firm's FCFE exceeds its FCFF?
    a. The firm has issued substantial amounts of debt
    b. The firm has forecast low revenue growth
    c. The firm pays high dividends
3. What is the change in net working capital for a firm that has current year Total Current Assets (including Cash and Equivalents) of $5,000, Cash and Equivalents of $500, and Total Current Liabilities of $4,000 if in the previous year Total Current Assets (including Cash and Equivalents) was $4,000, Cash and Equivalents was $600, and Total Current Liabilities was $3,000.
    a. $100
    b. -$100
    c. $0
4. An analyst *mistakenly* estimates the intrinsic value of the stock is greater than the stock price. Which of the following would have led to them making this mistake?
    a. Overestimating the WACC
    b. Using an estimate of beta lower than the stock's actual beta
    c. Using an exit multiple lower that they should have

NOTES & REFERENCES

[1] The interest expense times (1-t) accounts for the pre-tax benefit associated with payments on debt.
[2] WACC might also include preferred stock, where P is the market value of preferred stock, R_P is the cost of preferred, and V = E + D + P: $WACC = \frac{E}{V}R_E + \frac{D}{V}R_D(1 - t_C) + \frac{P}{V}R_P$
[3] CFA Question answers: 1)C, 2)A, 3)A, 4)B