

## R38 Equity Valuation: Concepts and Basic Tools

1. Introduction .....	2
2. Estimated Value and Market Price .....	2
3. Categories of Equity Valuation Models .....	2
4. The Background for the Dividend Discount Model.....	3
4.1 Dividends: Background for the Dividend Discount Model.....	3
5. Dividend Discount Model (DDM) and Free-Cash-Flow-to-Equity Model (FCFE) .....	4
6. Preferred Stock Valuation .....	5
7. The Gordon Growth Model .....	6
8. Multistage Dividend Discount Models.....	8
9. Multiplier Models and Relationship Among Price Multiples, Present Value Models, and Fundamentals.....	9
9.1 Relationships among Price Multiples, Present Value Models, and Fundamentals.....	10
10. Method of Comparables and Valuation Based on Price Multiples .....	11
10.1 Illustration of a Valuation Based on Price Multiples.....	12
11. Enterprise Value.....	12
12. Asset-Based Valuation.....	13
Summary .....	15
Practice Questions .....	20

This document should be read in conjunction with the corresponding reading in the 2022 Level I CFA® Program curriculum. Some of the graphs, charts, tables, examples, and figures are copyright 2021, CFA Institute. Reproduced and republished with permission from CFA Institute. All rights reserved.

Required disclaimer: CFA Institute does not endorse, promote, or warrant the accuracy or quality of the products or services offered by IFT. CFA Institute, CFA®, and Chartered Financial Analyst® are trademarks owned by CFA Institute.

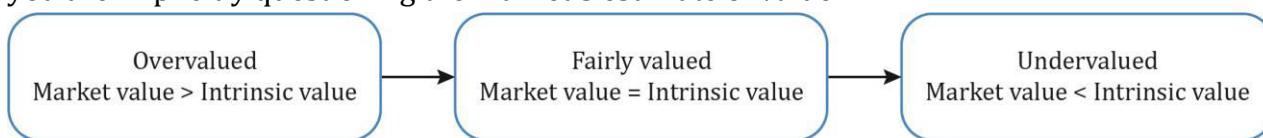
Version 1.0

## 1. Introduction

We began the equities section with a discussion on how securities markets are organized, how efficient markets are, the different types of equity securities, and how to analyze an industry and a company. The focus of this reading is on determining the intrinsic value of the security.

## 2. Estimated Value and Market Price

The **intrinsic value** of a security is based on its fundamentals and characteristics. It is also called the fundamental value or estimated value as it is based on the fundamentals such as earnings, sales, and dividends. If the intrinsic value is different from the market price, then you are implicitly questioning the market's estimate of value.



Assume, Caterpillar Inc. is trading on NYSE at \$84.53. An analyst estimates its intrinsic value as \$88.21. Is it overvalued, fairly valued, or undervalued? Going by the relationships given above, the security is undervalued. In reality, making this decision is not that straightforward. It depends on an analyst's input values and assumptions in the model. Some factors to consider when market value  $\neq$  intrinsic value:

- *Percentage difference between the market price and intrinsic value.* Assume you calculate the intrinsic value of a security to be \$95, but it is currently trading at \$180. Since the percentage difference is large, it is prudent to calculate the intrinsic price once again because the assumptions or input data to the model may be incorrect.
- *Confidence in your model.* High confidence means the market price will converge to the intrinsic value over the time horizon considered. If your confidence is low, you might see the two prices diverging substantially.
- *Model sensitivity to assumptions.* If many securities appear to be under- or overvalued, analysts should check the model's sensitivity to their inputs.
- *Number of analysts.* The more the number of analysts covering a security, the less the mispricing. Recollect what we read about efficient markets. The market price, in this case, is likely to reflect intrinsic value. Securities neglected by analysts are often mispriced.

## 3. Categories of Equity Valuation Models

Three major categories of equity valuation model are:

### Present value models

- They estimate value as present value of expected future benefits.
- Future benefits are defined as either cash distributed to shareholders (dividend discount models) or cash available to shareholders after meeting the necessary

capital expenditure and working capital expenses (free-cash-flow-to-equity models).

### **Multiplier models**

- They estimate intrinsic value based on a multiple of some fundamental variable.
- For example, either Stock price / earnings (or sales, book value, cash flow).
- Or Enterprise value / EBITDA (or sales).

### **Asset-based valuation models**

- They estimate the value of equity as the value of assets less the value of liabilities.
- Book values of assets and liabilities are typically adjusted to their fair values when using these models.

The choice of model depends on availability of information and the analyst's confidence in the appropriateness of the model. Generally, analysts will try to use more than one model.

## **4. The Background for the Dividend Discount Model**

### **4.1 Dividends: Background for the Dividend Discount Model**

A dividend is a distribution made to shareholders based on the number of shares owned.

**Cash dividends** are payments made to shareholders in cash. The three types of cash dividends are:

1. Regular cash dividends: They are paid out on a consistent basis. A stable or increasing dividend is viewed as a sign of financial stability.
2. Special dividends: They are one-time cash payments when the situation is favorable (Also called as extra dividends or irregular dividends; used by cyclical firms).
3. Liquidating dividend: This is distributed to shareholders when a company goes out of business.

**Stock dividend**: Company distributes additional shares instead of cash. A stock dividend simply divides the 'pie' (the market value of equity) into smaller pieces without affecting the value of the pie. Since the market value of equity is unaffected, stock dividends are not relevant for valuation purposes.

**Stock split**: Increases the number of shares outstanding. For example, in a 2 for 1 split, each shareholder is issued an additional share for each share currently owned.

**Reverse stock split**: Reduces the number of shares outstanding. For example, in a 1 for two reverse stock split, each shareholder would receive one share for every two old shares.

Stock splits and reverse stock split are similar to stock dividends. They do not change the market value of equity hence they are not relevant for valuation purposes.

**Share repurchase**: This is an alternative to cash dividends. Here the company uses cash to buy back its own shares. An important point to note is that, as compared to stock dividends and stock splits, share repurchases affect the market value of equity. The effect on shareholders' wealth is equivalent to a cash dividend. Some key reasons why companies

engage in share repurchases instead of cash dividends are:

1. to support share prices.
2. flexibility in the amount and timing of cash distribution.
3. when tax rates on capital gains are lower than tax rates on dividends.
4. to offset the impact of employee stock options.

### **Dividend payment chronology**

A dividend payment schedule is as follows:

1. Declaration date: Company declares the dividend.
2. Ex-dividend date: Cutoff date on or after which buyers of a stock are not eligible for the dividend. Also is the first date when the stock trades without dividend.
3. Holder-of-record date: A record of shareholders who are eligible to receive the dividend is made (usually two days after the ex-dividend date).
4. Payment date: Dividend payment made to the shareholders.

## **5. Dividend Discount Model (DDM) and Free-Cash-Flow-to-Equity Model (FCFE)**

This model is based on the principle that the value of an asset should be equal to the present value of the expected future benefits. The simplest present value model is the dividend discount model (DDM). According to the DDM, the intrinsic value of a stock is the present value of future dividends, plus the present value of terminal value.

Intrinsic value = PV of future dividends + PV of terminal value

$$V_0 = \sum_{t=1}^n \frac{D^t}{(1+r)^t} + \frac{P^n}{(1+r)^n}$$

### **Example**

For the next three years, the annual dividends of stock X are expected to be 1.0, 1.1, and 1.2. The expected stock price at the end of year 3 is expected to be \$20.00. The required rate of return on the shares is 10%. What is the estimated value?

### **Solution:**

Calculate the present value of each of the future dividends at the required rate of return of 10%.

$$PV \text{ of cash flow } 1 = \frac{1}{1.1} = 0.909$$

$$PV \text{ of cash flow } 2 = \frac{1.1}{(1.1)^2} = 0.909$$

$$PV \text{ of cash flow } 3 = \frac{20+1.2}{(1.1)^3} = 15.928$$

$$\text{Estimated value} = 0.909 + 0.909 + 15.92 = 17.74$$

In the exam, use a financial calculator with the following keystrokes:

$CF_0 = 0$ ;  $CF_1 = 1$ ;  $CF_2 = 1.1$ ;  $CF_3 = 21.2$ ;  $I = 10\%$ , CPT NPV

$NPV = 17.7$

**Free cash flow to equity (FCFE)** is the residual cash flow available to be distributed as dividends to common shareholders. In practice, the FCFE model is often used because:

- FCFE is a measure of a firm's dividend-paying capacity.
- It can be used for a non-dividend paying stock (unlike DDM which requires the timing and the amount of the first dividend to be paid).
- It can also be used for a company that pays dividends which are extremely small or the dividends being paid are not an indication of a company's ability to pay dividends.
- Not all of the available cash flow is distributed to shareholders because a company retains some part of it for future investments as a going concern.

$$FCFE = CFO - FCInv + \text{Net borrowing}$$

where:  $FCInv = \text{fixed capital investment}$

$\text{Net borrowing} = \text{borrowings} - \text{repayments}$

$$V_0 = \sum_{t=1}^{\infty} \frac{FCFE^t}{(1+r)^t}$$

### Required Rate of Return on a share

Analysts generally use CAPM (capital asset pricing model) to calculate the required return on a share.

$$\text{Required rate of return on share} = \text{current expected risk free rate} + \text{Beta}_i [\text{market risk premium}]$$

In addition to CAPM, there are other methods to calculate the required return like the bond yield plus risk premium method which we will see later.

## 6. Preferred Stock Valuation

For a non-callable, non-convertible perpetual preferred share paying a level dividend and assuming a constant required rate of return, the value is given by the equation below:

$$V_0 = \frac{D_o}{r}$$

where:  $V_0 = \text{present value of the perpetuity}$ ;  $D_o = \text{dividend}$  and  $r = \text{rate of return}$

### Example

A \$100 par value, non-callable, non-convertible perpetual preferred stock pays a 5% dividend. The discount rate is 8%. Calculate the intrinsic value of the preferred share.

### Solution:

Expected annual dividend =  $0.05 \times 100 = 5$

Value of the preferred share =  $5.00 / 0.08 = 62.50$

Other types of preferred shares to consider are:

- *Shares which mature on a given date:* In the earlier example, instead of being a perpetual share, assume the share matured after four years. To calculate the value of this share, calculate the present value of the four dividends with the last one paid at the end of the fourth year at the required rate of 8%. Input these values in your financial calculator: N = 4; I = 8; PMT = 5; FV = 100; PV =? Present value of this share = 90.06.
- *Callable (redeemable) shares:* These shares are callable by the issuer at some point before maturity. Assuming all the conditions are the same as the shares which mature on a given date, will investors pay 90.06, or less or more for this share? They will pay less for this share as investors stand the risk of the issuer calling the share when it trades above the par value.
- *Shares with retraction option (putable shares):* Here, the holder of the preferred stock has an option to sell the share to the issuer at a specified price before the maturity date. Unlike callable shares, putable shares will trade at a value above 90.06 as the put option is valuable to investors. If the share trades below the par value, investors can sell it back to the issuer.

## 7. The Gordon Growth Model

One of the disadvantages of the dividend discount model is that it is difficult to accurately estimate the amount of dividends for a long period of time. The Gordon growth model simplifies this by assuming that **dividends grow indefinitely at a constant rate**; it is also called the constant-growth dividend discount model. According to this model, the intrinsic value of a security can be calculated as:

$$V_0 = \frac{D_1}{r - g}$$

where:

$D_1$  = next period's dividend

$r$  = required rate of return

$g$  = dividend growth rate

In the equation above, if the growth rate is zero, then the equation reduces to the present value of a perpetuity.

To estimate a long-term growth rate of dividends, analysts use various methods such as:

- Using the historic growth rate for the firm
- Using the industry median growth rate
- Estimating the sustainable growth rate using the formula:  $g = b \times ROE$   
where:  $b$  = earnings retention rate = (1 - dividend payout ratio)

ROE = return on equity

### **Assumptions of the Gordon Growth model:**

- Dividends are the correct metric to use for valuation purposes. Dividends are a reflection of a company's earnings.
- Dividend growth rate is perpetual.
- Required rate of return is constant throughout the life of the security.
- Dividend growth rate < required rate of return.

### **When is it not appropriate to use the Gordon Growth Model?**

- If the company is currently not paying a dividend as it may reinvest earnings in attractive opportunities.
- If the company is not profitable enough currently to pay a dividend. An analyst may still use the model by assuming that the company will pay a dividend in the future.

### **What happens to the value if dividend value is increased?**

Let us look at the formula again.  $V_0 = \frac{D_1}{r-g}$

When dividend increases, numerator increases. If the payout ratio increases, retention rate decreases and value of g decreases. If g decreases, the denominator increases. As a result, the impact on value, if the dividend is increased cannot be determined with certainty.

#### **Example**

Estimate the intrinsic value of a stock given the following data:

Beta = 1.5; RFR = 3%; market risk premium = 5%; dividend just paid = \$1.00; dividend payout ratio = 0.4; return on equity = 15%.

#### **Solution:**

$$V_0 = \frac{D_1}{r-g} = \frac{D_0 * (1+g)}{r-g}$$

Note: the values of r, g and expected dividend are not given. So, first calculate these values.

$$r = RFR + Beta \times \text{market risk premium} = 3 + 1.5 \times 5 = 10.5\%$$

$$g = b \times ROE = (1 - 0.4) \times 0.15 = 0.09$$

$$\text{Applying the Gordon growth model, } V_0 = 1 \times \frac{1.09}{0.105 - 0.09} = 72.67$$

#### **Example**

A company does not currently pay dividend but is expected to begin to do so in 4 years. The first dividend is expected to be \$2.00 and to be received at the end of year 4. The dividend is expected to grow at 5% into perpetuity. The required return is 10%. What is the estimated current intrinsic value?

**Solution:**

To calculate the intrinsic value, first calculate the value of dividend at the end of period 3 and then discount it to  $t=0$  using the Gordon growth model.

$$V_3 = \frac{D_4}{r - g} = \frac{2}{0.10 - 0.05} = 40$$

$$V_0 = \frac{40}{(1.1)^3} = 30.05$$

**Instructor's Note:** Do not forget to discount 40 to the present value. The undiscounted value is commonly presented as one of the answer options as a trap.

## 8. Multistage Dividend Discount Models

It is an ideal situation to assume that all companies grow at a constant rate indefinitely and pay a constant dividend. The assumption is true to an extent only for stable companies. In reality, companies go through a finite rapid growth phase followed by an infinite period of sustainable growth.

A two-stage DDM can be used to calculate the value of such companies transitioning from growth to mature stage. The Gordon growth model may be used to calculate the terminal value at the beginning of the second stage which represents the present value of dividends during the sustainable growth phase.

$$V_0 = \sum_{t=1}^n \frac{D_0(1 + g_s)^t}{(1 + r)^t} + \frac{V_n}{(1 + r)^n}$$

The first term is discounting the dividends during the high growth period. The second term is calculating the terminal value for the second sustainable growth period and then discounting it to the present value where  $V_n$  = terminal value at time n estimated using the Gordon growth model.

**Example**

Let us understand the concept better with the help of an example. The current dividend for a company is \$4.00. The dividends are expected to grow at 20% a year for 4 years and then at 10% after that. The required rate of return is 18%. Estimate the intrinsic value.

**Solution:**

First draw a timeline.



We will use this formula:

$$V_0 = \sum_{t=1}^n \frac{D_0(1 + g_s)^t}{(1 + r)^t} + \frac{V_n}{(1 + r)^n}$$

where  $n = 4$  (high growth period)

$$\text{Solve for the second term: } \frac{V_n}{(1+r)^n}; V_4 = \frac{D_5}{r-g} = \frac{D_4(1 + g_L)}{r - g} = \frac{8.29 * 1.1}{0.18 - 0.1} = \frac{9.12}{0.08} = 114$$

Using the financial calculator, we can calculate the present value of dividends and terminal value by entering the following values:  $CF_0 = 0$ ;  $CF_1 = 4.8$ ;  $CF_2 = 5.76$ ;  $CF_3 = 6.91$ ;  $CF_4 = 8.29 + 114$ ;  $I = 18$ ;  $NPV = 75.48$

*Note: while calculating  $V_4$ , you need to use 10% as growth rate since it is the long-term growth rate.*

### Three Stage Models

The concept of a two-stage model can be extended to as many stages as a company goes through. Often, companies go through three stages beyond the startup phase: growth, transition, and maturity.

## 9. Multiplier Models and Relationship Among Price Multiples, Present Value Models, and Fundamentals

**Price multiple** is a ratio that uses a company's share price with some monetary flow/value for evaluating the relative worth of a company's stock. Commonly used price multiple ratios are listed below:

<b>Price multiples</b>	
<b>Ratio</b>	<b>What it measures</b>
Price-to-earnings ratio (P/E)	<p>Trailing P/E: <math>\frac{\text{Price per share}}{\text{Trailing 12 month earnings per share}}</math></p> <p>For example, price = 50, EPS = 5; P/E = 10</p> <p>Forward/leading/estimated P/E: <math>\frac{\text{Stock price}}{\text{Leading 12 month earnings per share}}</math></p> <p>Most commonly used ratio. Analysts prefer stocks with low P/E to high P/E.</p>
Price-to-book ratio P/B	<p>P/B = <math>\frac{\text{Price per share}}{\text{Book value per share}}</math></p> <p>Book value per share = <math>\frac{\text{Assets} - \text{Liabilities}}{\text{Shares outstanding}}</math></p> <p>Evidence suggests that companies with low P/B tend to outperform stocks with high P/B (expensive stock).</p>

Price-to-sales ratio	$P/S = \frac{\text{Price per share}}{\text{Sales per share}}$ Like P/E ratio, this can be trailing or leading ratio. One advantage of P/S ratio is that it can never be negative unlike P/E as earnings can be negative. It is useful during periods of economic slowdown or extraordinary growth.
Price-to-cash-flow ratio	$P/CF = \frac{\text{Price per share}}{\text{Cash flow per share}}$ One aspect to note here is what cash flow measure has been used by the analyst. The cash flow measure may be operating cash flow, free cash flow, etc.
Common criticism: These ratios do not consider the future. When forecasts of fundamental values are used, such as estimated EPS in leading P/E, the P/E value may differ substantially from the trailing P/E. When comparing companies, the multiples should be consistently used. For example, you cannot compare the trailing P/E of one company with a leading P/E of another company.	

**Instructor's Note:**

For a growing company, what will be higher: the leading P/E or the trailing P/E?

The trailing P/E will be higher as the earnings are higher in the future periods. So the leading P/E will be lower.

### 9.1 Relationships among Price Multiples, Present Value Models, and Fundamentals

We can link price multiple to fundamentals through a discounted cash flow model such as the Gordon Growth Model. How? By assuming that the intrinsic value of a security is equal to its market price, i.e., the security is fairly valued.

$$V_0 = \frac{D_1}{r-g} \text{ becomes } P_0 = \frac{D_1}{r-g} \text{ if we assume that: } V_0 = P_0$$

$$\text{Forward P/E} = \frac{P_0}{E_1} = \frac{\frac{D_1}{r-g}}{\frac{E_1}{r-g}} = \frac{\text{Dividend payout ratio}}{r-g}$$

The multiple you see above is related to the fundamentals as both dividend payout ratio and growth rate represent the fundamentals of a company. Some interpretations based on the formula:

- The forward P/E and payout ratio appear to be positively related. But, it does not necessarily mean a higher dividend payout increases the P/E.
- A higher payout ratio may mean the company is retaining less for reinvestment, which in turn means, a slower growth rate. Since P/E and growth rate are positively related, if  $g$  slows (denominator increases), then P/E decreases. This is known as dividend displacement of earnings.
- P/E is inversely related to the required rate of return.

**Example**

Between 2008 and 2012, a company's dividend payout ratio has been 40% on average. In 2008, the dividend was \$1.00 and has grown steadily to \$1.8 for 2012. This growth rate is expected to continue in the future. Using a discount rate of 20%, estimate the company's justified forward P/E.

**Solution:**

$$\frac{P}{E_1} = \frac{\text{Payout ratio}}{r - g}$$

The growth rate is not given. So calculate  $g$  with the information given about dividends. The growth rate is expected to continue; so it will be the long-term constant growth rate.

$$g = \left(\frac{1.8}{1}\right)^{\frac{1}{4}} - 1 = 0.16$$

$$\frac{P}{E_1} = \frac{0.4}{0.2 - 0.16} = 10$$

## 10. Method of Comparables and Valuation Based on Price Multiples

This method compares relative values estimated using multiples. The objective is to determine if a stock or asset is fairly valued, undervalued, or overvalued relative to the benchmark value of the multiple. For example, if the average P/B value for private sector banks is 1.1, and the P/B for the bank under consideration is 0.65, then it is relatively undervalued, all else equal. This method is based on the principle that similar assets should be priced the same: **the law of one price**.

For example, assume that there are two companies the data for which is given below:

	<b>Company A</b>	<b>Company B</b>
P	100	50
E <sub>1</sub>	10	6
P/E	10	8.3

On a relative value basis, company B is a better buy.

The primary difference between P/E multiples based on comparables and P/E multiples based on fundamentals:

- P/E multiple based on comparables uses the law of one price. For example, if the trailing P/E of Caterpillar is 13.2, Komatsu is 15.5, and Deere is 9.6. Which one of these is undervalued? Given this data, Deere is undervalued relative to the other stocks.
- P/E multiple based on fundamentals is calculated as payout ratio/(r - g). With this method we only need information about a target company.

## 10.1 Illustration of a Valuation Based on Price Multiples

In this section, we will see through examples how price multiples are used in cross-sectional analysis, time-series analysis, and in valuing a private company.

### Example

The table below presents the current P/E ratio of a few automobile companies.

Company	P/E
Volkswagen	12.01
Ferrari	24.57
Lamborghini	13.42
Pagani	14.1

### Solution:

This is a cross-sectional analysis as different companies are compared at a specific point in time. According to the data, Volkswagen is the most undervalued as it has the lowest P/E. For every \$ of earnings, we are paying \$12.01. It must be noted that several other factors in conjunction with relative value analysis must be performed before making a buy decision. Share prices plunge if a company is on the verge of bankruptcy.

### Example

The table below computes the P/E ratio for Nikon over a five period 2012 - 2016. Determine if the stock is overvalued or undervalued relative to historic levels?

Year	Price (in \$)	EPS	P/E = Price/EPS
2012	17.52	1.71	10.25
2013	29.19	1.42	20.56
2014	35.7	1.2	29.75
2015	7.55	0.61	12.38
2016	5.42	0.48	11.3

### Solution:

This is a time series analysis. The 2012 P/E level for Nikon indicates it is undervalued relative to the historic high of 29.75 in 2014. Analysts may recommend buying the stock if it were to return to the historic high levels provided the increase in P/E is not due to a decrease in EPS, which is not the case here. Other fundamental factors should also be considered such as slowing revenues, the growing popularity of alternative cameras and smartphones affecting Nikon's business, slowing economy, etc.

## 11. Enterprise Value

Enterprise value is used as an alternate measure for equity; it measures the market value of the whole company (debt and equity).

$$\text{Enterprise value} = \text{market value of debt} + \text{market value of equity} + \text{market value of}$$

preferred stock – cash and investments

$EV = MVE + MVD + MVP - \text{cash and cash equivalents}$

*Note: use estimates if market values are not available*

The most commonly used EV multiple is EV/EBITDA. EBITDA is earnings before interest, taxes, depreciation, and amortization. It is a proxy for cash flow, or how much cash the company is generating. However, it may include other non-cash expenses and revenues.

### When is EV/EBITDA used?

- When earnings are negative, making P/E useless. EBITDA is usually positive.
- For comparing companies with significant differences in capital structure.
- To evaluate the cost of a takeover.

A major limitation of the enterprise value model is that it is difficult to obtain the market value of debt.

### Example

The EV/EBITDA ratio for a company is 10. EBITDA is 20 million. Market value of debt is 50 million. Cash is 2 million. What is the value of equity?

### Solution:

$$\frac{EV}{EBITDA} = \frac{MVD + MVE - \text{Cash}}{EBITDA}$$

$$10 = \frac{50 + MVE - 2}{20}$$

MVE = 152 million

## 12. Asset-Based Valuation

An asset-based valuation of a company uses the estimates of the market or the fair value of the company's assets and liabilities. This valuation method is appropriate for companies that have low proportion of intangible or off-the-books assets. It is commonly used for valuing private enterprises.

Other factors to consider:

- Book values may be very different from market values.
- Some intangible assets are not reported; asset-based value could be considered a 'floor' value.
- Asset values are hard to estimate in a hyper-inflationary environment.

Some examples when this method is not appropriate:

- A hugely popular restaurant in a rented space. The restaurant is popular because of the proprietor's cooking skills and secret recipes. The proprietor would like to sell the business and retire. This method is not appropriate as setting a value for the

proprietor's cooking skills is challenging. Only the restaurant's equipment, inventory, and furniture can be valued.

- In the case of a laundry business, the equipment and inventory can be valued at depreciated value or at replacement cost. But intangibles such as convenience due to location, clever marketing, etc. cannot be assigned a value.

The tables below list the pros and cons of the different valuation models we have seen so far.

<b>Comparables Valuation Using Multiples</b>	
<b>Advantages</b>	<b>Disadvantages</b>
Good predictor of future returns.	Lagging numbers tell about past.
Widely used.	Not always comparable across firms.
Easily available.	Impacted by economic conditions.
Time-series comparison.	Might conflict with fundamental method.
Cross-sectional comparison.	Sensitive to different accounting methods.
Allows us to identify relatively underpriced securities.	Negative denominator.

<b>DCF</b>	
<b>Advantages</b>	<b>Disadvantages</b>
Based on PV of future cash flows.	Inputs have to be estimated.
Widely accepted and used.	Estimates sensitive to inputs.

<b>Asset-Based Model</b>	
<b>Advantages</b>	<b>Disadvantages</b>
Floor values.	Market values hard to determine.
Works when assets have easily determinable market values.	Market values often different from book values.
Works well for companies that report fair values.	Do not account for intangible assets.
	Asset values hard to determine during hyperinflation.

## Summary

**LO.a: Evaluate whether a security, given its current market price and a value estimate, is overvalued, fairly valued, or undervalued by the market.**

Market value > Intrinsic value - Overvalued

Market value = Intrinsic value - Fairly valued

Market value < Intrinsic value - Undervalued

Factors to consider when market value  $\neq$  intrinsic value:

- Percentage difference between the market price and intrinsic value.
- Confidence in your model.
- Model sensitivity to assumptions.
- Number of analysts.

**LO.b: Describe major categories of equity valuation models.**

Type of Model	Characteristics
Present Value Models	<ul style="list-style-type: none"> <li>• Estimate intrinsic value as the present value of expected future benefits.</li> <li>• Future benefits defined as cash to be paid to shareholders, or cash flows available to be distributed to shareholders.</li> <li>• Ex: Gordon growth model, two-stage dividend discount model, free cashflow to equity model.</li> </ul>
Multiplier Models, also known as market multiple models	<ul style="list-style-type: none"> <li>• Based on share price multiples or enterprise value multiples.</li> <li>• The share price multiple model estimates intrinsic value based on a multiple of some fundamental variable such as revenues, earnings, cash flows, or book value.</li> <li>• Ex: P/E, P/S</li> <li>• Enterprise value multiple models are of the form: enterprise value/some fundamental variable. Here, the fundamental variable is usually EBITDA or revenue.</li> </ul>
Asset-Based Models	<ul style="list-style-type: none"> <li>• Estimate intrinsic value based on the estimated value of assets and liabilities.</li> </ul>

**LO.c Describe regular cash dividends, extra dividends, stock dividends, stock splits, reverse stock splits, and share repurchases**

Cash dividends are payments made to shareholders in cash. The three types of cash dividends are:

1. Regular cash dividends are paid out on a consistent basis. Stable or increasing dividend is viewed as a sign of financial stability.
2. Special dividends are one-time cash payments when the situation is favorable (also

called as extra dividends or irregular dividends; used by cyclical firms).

3. Liquidating dividend is distributed to shareholders when a company goes out of business.

Stock dividends are payments made to shareholders in additional shares instead of cash.

Stock Splits divides each existing share into multiple shares.

Reverse stock splits are the opposite of stock splits and decreases the total number of outstanding shares.

Share repurchase is when a company buys back its own outstanding shares using cash.

#### **LO.d: Describe dividend payment chronology**

A dividend payment schedule is as follows:

1. Declaration date: Board of directors approves dividend.
2. Ex-dividend date: Cutoff date on or after which buyers of a stock are not eligible for the dividend. It is also the first date when the stock trades without dividend.
3. Holder-of-record date: An entry of shareholders eligible for the dividend is made (usually two days after the ex-dividend date).
4. Payment date: Dividend payment made to the shareholders.

#### **LO.e: Explain the rationale for using present value models to value equity and describe the dividend discount and free-cash-flow-to-equity models.**

This model is based on the principle that the value of an asset should be equal to the present value of the expected future benefits. The simplest present value model is the dividend discount model (DDM).

According to the DDM, the intrinsic value of a stock is the present value of future dividends, plus the present value of the terminal value. It can be calculated using the formula:

$$V_0 = \sum_{t=1}^n \frac{D^t}{(1+r)^t} + \frac{P^n}{(1+r)^n}$$

Free-cash-flow-to-equity (FCFE) is the residual cash flow available to be distributed as dividend to common shareholders. FCFE model is used because it is a measure of a firm's dividend-paying capacity and can be used for stocks with small dividends or no dividend.

$$\text{FCFE} = \text{CFO} - \text{FCInv} + \text{Net borrowing}$$

$$V_0 = \sum_{t=1}^{\infty} * \left( \frac{\text{FCFE}^t}{(1+r)^t} \right)$$

$$\text{Required return on share} = \text{risk free rate} + \text{Beta}_i [\text{market risk premium}]$$

**LO.f: Calculate the intrinsic value of a non-callable, non-convertible preferred stock.**

$$V = \frac{D}{r}$$

where:

V = present value of the perpetuity

D = dividend and r = rate of return

**LO.g: Calculate and interpret the intrinsic value of an equity security based on the Gordon (constant) growth dividend discount model or a two-stage dividend discount model, as appropriate.**

The Gordon growth model assumes that dividends grow indefinitely at a constant rate. It is also called the constant growth dividend discount model.

$$V_0 = \frac{D_1}{r - g}$$

where: g = retention rate \* ROE

For a multi staged dividend discount model:

$$V_0 = \sum_{t=1}^n \frac{D_0(1 + g_s)^t}{(1 + r)^t} + \frac{V_n}{(1 + r)^n}$$

The first term is discounting the dividends during the high growth period. The second term is calculating the terminal value for the second sustainable growth period and then discounting it to the present value.

**LO.h: Identify characteristics of companies for which the constant growth or a multistage dividend discount model is appropriate.**

The constant growth model is appropriate for companies that pay dividends growing at a constant rate. These are usually mature and stable firms (e.g., producer of a staple food product).

A two-stage DDM can be used to calculate the value of companies transitioning from growth to mature stage.

A three-stage model is used for companies that go through three stages beyond the startup phase: growth, transition, and maturity.

**LO.i: Explain the rationale for using price multiples to value equity and distinguish between multiples based on comparables versus multiples based on fundamentals.**

Price multiple is a ratio that uses a company's share price with some monetary flow/value for evaluating the relative worth of a company's stock.

The method of comparables compares relative values estimated using multiples. The objective is to determine if a stock or asset is fairly valued, undervalued, or overvalued

relative to the benchmark value of the multiple. It is based on the law of one price.

Price multiple can be linked to fundamentals through a discounted cash flow model such as the Gordon Growth Model by assuming that the intrinsic value of a security is equal to its market price, i.e., the security is fairly valued.

$$\text{Forward P/E} = \frac{\frac{D_1}{E_1}}{r - g} = \frac{\text{dividend payout ratio}}{r - g}$$

**LO.j: Calculate and interpret the following multiples: price to earnings, price to an estimate of operating cash flow, price to sales, and price to book value.**

Price-to-earnings ratio (P/E):

$$\text{Trailing P/E} = \frac{\text{price per share}}{\text{trailing 12 month earnings per share}}$$

$$\text{Forward P/E} = \frac{\text{stock price}}{\text{leading 12 month earnings per share}}$$

$$\text{Price - to - book ratio P/B} = \frac{\text{price per share}}{\text{book value per share}}$$

$$\text{Price - to - sales ratio P/S} = \frac{\text{price per share}}{\text{sales per share}}$$

$$\text{Price - to - cashflow ratio P/CF} = \frac{\text{price per share}}{\text{cash flow per share}}$$

**LO.k: Describe enterprise value multiples and their use in estimating equity value.**

Enterprise value is used as an alternate measure for equity. It measures the market value of the whole company (debt and equity).

Enterprise value = market value of debt + market value of equity + market value of preferred stock – cash and investments

The most commonly used EV multiple is EV/EBITDA. It is used in the following situations:

- When earnings are negative making P/E useless.
- For comparing companies with significant differences in capital structure.
- To evaluate the cost of a takeover.

**LO.l: Describe asset-based valuation models and their use in estimating equity value.**

An asset-based valuation of a company uses the estimates of the market or the fair value of the company's assets and liabilities. This valuation method is appropriate for companies that have low proportion of intangible or off-the-books assets. It is commonly used for valuating private enterprises.

**LO.m: Explain advantages and disadvantages of each category of valuation model.**

<b>Advantages</b>	<b>Disadvantages</b>
<b>Comparables Valuation Using Multiples</b>	
Good predictor of future returns.	Lagging numbers tell about past.
Widely used.	Not always comparable across firms.
Easily available.	Impacted by economic conditions.
Time-series comparison.	Might conflict with fundamental method.
Cross-sectional comparison.	Sensitive to different accounting methods.
Allows us to identify relatively underpriced securities.	Negative denominator.
<b>DCF</b>	
Based on PV of future cash flows.	Inputs have to be estimated.
Widely accepted and used.	Estimates sensitive to inputs.
<b>Asset-Based Model</b>	
Floor values.	Market values hard to determine.
Works when assets have easily determinable market values.	Market values often different from book values.
Works well for companies that report fair values.	Does not account for intangible assets.
	Asset values hard to determine during hyperinflation.

## Practice Questions

1. An analyst determines the intrinsic value of a stock to be equal to \$30. The current market price of the stock is \$35. This stock is *most likely*:
  - A. undervalued.
  - B. overvalued.
  - C. fairly valued.
  
2. An investor expects a share to pay dividends of \$1 and \$2 at the end of Years 1 and 2, respectively. At the end of the second year, the investor expects the share to trade at \$20. If the required rate of return is 10%, then according to the dividend discount model, the intrinsic value of the stock today is *closest* to:
  - A. \$18.
  - B. \$19.
  - C. \$20.
  
3. PPS has recently declared a regular quarterly dividend of \$0.25, payable on 15 November, with an ex-dividend date of 31<sup>st</sup> October. Given the following options include all business days, which of the following is *most likely* to be the holder-of-record date assuming trades settle two business days after the trade date?
  - A. 29th October.
  - B. 31st October.
  - C. 2nd November.
  
4. A firm has an expected dividend payout ratio of 40% and an expected future growth rate of 8%. What should the firm's fundamental price-to-earnings ratio be if the required rate of return on similar stocks is 12%?
  - A. 6x.
  - B. 8x.
  - C. 10x.
  
5. An analyst has determined that the appropriate EV/EBITDA for a company is 10. The analyst has also collected the following information about the company:  
EBITDA = \$20 million  
Market value of debt = \$60 million  
Cash = \$1 million  
The value of equity for the company is *closest* to:
  - A. 139 million.
  - B. 141 million.
  - C. 145 million.

6. The P/S data for a few Fertilizer companies for 2018 is given below. Based only on this information, which stock is most undervalued?

Company	P/S (2018)
Greeno	0.15
PMP	0.08
Alco	0.10

- A. Greeno.
  - B. PMP.
  - C. Alco.
7. A company has an issue of 5%, \$50 par value, perpetual, non-convertible, non-callable preferred shares outstanding. The required rate of return on similar issues is 4%. The intrinsic value of a preferred share is *closest* to:
- A. \$44.5.
  - B. \$50.0.
  - C. \$62.5.
8. Which of the following assumptions is required by the Gordon growth model?
- A. Constant growth rate > required rate of return.
  - B. Constant growth rate < required rate of return.
  - C. Constant growth rate = required rate of return.
9. Bright industries has just paid a dividend of \$5 per share. If the required rate of return is 10% per year and the dividends are expected to grow indefinitely at a constant growth rate of 8% per year, the intrinsic value of Bright industries stock is *closest* to:
- A. \$250.
  - B. \$270.
  - C. \$300.
10. An analyst has gathered the following data for a company:
- Return on equity 15%
- Dividend payout ratio 30%
- Required rate of return on shares 20%
- Current year's dividend per share \$2
- Using the Gordon growth model, the intrinsic value per share is *closest* to:
- A. \$20.48.
  - B. \$21.75.
  - C. \$23.26.
11. The constant growth model can be used to value dividend-paying companies that are:

- A. expected to grow very fast.  
 B. in a mature phase of growth.  
 C. very sensitive to the business cycle.
12. Assume that a stock is expected to pay dividends at the end of Year 1 and Year 2 of \$2 and \$3, respectively. Dividends are expected to grow at 5% rate thereafter. If the required rate of return is 10%, the value of the stock is *closest* to:  
 A. \$56.36.  
 B. \$58.45.  
 C. \$60.24.
13. An asset-based valuation model would be *best* suited for a:  
 A. privately held company.  
 B. company with relatively high level of intangible assets.  
 C. company where the market value of assets and liabilities are different from the balance sheet values.
14. Which of the following is *least likely* an advantage of using asset-based valuation model?  
 A. Asset-based valuation model works well for both tangible and intangible assets.  
 B. Asset-based valuation model is preferred to use for companies that report fair values.  
 C. Asset-based valuation model can be used when assets have easily determinable market values.
15. An analyst gathers the following information about a company:
- Balance Sheet**
- | <b>Assets</b>                  | <b>Liabilities and Shareholders' Equity</b>    |
|--------------------------------|--|
| Cash: \$3,000                  | Accounts payable: \$8,000                      |
| Accounts receivable: \$10,000  | Notes payable: \$15,000                        |
| Inventory: \$30,000            | Long-term debt: \$30,000                       |
| Net fixed assets 60,000        | Common shareholders' equity: \$50,000          |
| <b>Total assets: \$103,000</b> | <b>Total liabilities and equity: \$103,000</b> |
- Additional Information**
- Number of outstanding shares: 2,500  
 Market value of accounts receivable and inventory: 90% of reported values  
 Net fixed assets: 110% of reported value  
 Accounts payable and notes payable: 85% of reported values  
 Using asset-based valuation approach, the estimated value per share is *closest* to:  
 A. \$20.00.  
 B. \$21.38.  
 C. \$22.18.



## Solutions

1. B is correct. The market price is more than the estimated intrinsic value hence the stock is overvalued.

2. B is correct.  $CF_0 = 0$ ,  $CF_1 = \$1$ ,  $CF_2 = \$2 + \$20$ ,  $I/Y = 10\%$ ; CPT  $\rightarrow NPV = \$19$

3. C is correct. The holder-of-record date, 2<sup>nd</sup> November, is two business days after the ex-dividend date, 31<sup>st</sup> October.

4. C is correct. The P/E ratio based on fundamentals is calculated as:

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k - g} = \frac{0.4}{0.12 - 0.08} = 10x$$

5. B is correct.

$$EV = 10 \times 20 \text{ million} = 200 \text{ million.}$$

$$\text{Equity value} = EV - \text{Debt} + \text{Cash} = 200 \text{ million} - 60 \text{ million} + 1 \text{ million} = 141 \text{ million.}$$

6. B is correct. Since PMP is trading at the lowest price per unit of sales, it is the most underpriced.

7. C is correct. The expected annual dividend is  $5\% \times \$50 = \$2.50$ . The value of a preferred share is  $\$2.5 / 0.04 = \$62.5$ .

8. B is correct. For the Gordon growth model, the constant growth rate must be less than the required rate of return.

$$P_0 = \frac{D_1}{k - g}$$

9. B is correct.

$$P_0 = \frac{D_1}{k - g} = \frac{\$5(1.08)}{0.1 - 0.08} = \$270$$

10. C is correct.  $g = b \times ROE$ ;  $b = \text{earnings retention rate} = (1 - \text{Dividend payout ratio})$

$$D_1 = D_0(1 + g); V_0 = D_1 / (r - g)$$

$$b = 1 - 0.30 = 0.70; g = 0.70 \times 15 = 10.5\%;$$

$$D_1 = 2(1.105) = \$2.21;$$

$$V_0 = 2.21 / (0.2 - 0.105) = \$23.26$$

11. B is correct. The Gordon growth model (also known as the constant growth model) can be used to value dividend-paying companies in a mature phase of growth because one of

the assumptions of this model is that we need stable dividend growth rates. This assumption would be violated in options A and C.

12. A is correct. Using a two-stage model, we get:

$$(\$2/1.1) + (\$3/(0.1-0.05)/1.1 = \$56.36$$

13. A is correct. Asset-based valuations are most often used when an analyst is valuing private enterprises. Both options B and C are examples of companies where the asset-based valuation model should not be used.

14. A is correct.

- Advantages
  - Floor values
  - Works when assets have easily determinable market values
  - Works well for companies that report fair values
- Disadvantages
  - Market values hard to determine
  - Market values often different from book values
  - Do not account for intangible assets
  - Hyperinflation

15. C is correct. Market value of assets:  $3000 + (10000 + 30000) * 0.9 + 60000 * 1.10 = 105,000$

Market value of liabilities:  $(8000 + 15000) * 0.85 + 30000 = 49,550$

Estimated value per share:  $\frac{MV \text{ of assets} - MV \text{ of liabilities}}{\text{No.of outstanding shares}} = \frac{105,000 - 49550}{2500} = \$22.18$