Lecture

IAQS | INSTITUTE OF ACTUARIAL & QUANTITATIVE STUDIES

Class: MSc

Subject : Portfolio Theory and Security Analysis

Subject Code:

Chapter: Unit 4 Chapter 2

Chapter Name: Equity Valuation: Concepts and Basic Tools

Today's Agenda

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1 Introduction

- Equity valuation models used to estimate the intrinsic value (synonym: fundamental value) of a security; intrinsic value is based on an analysis of investment fundamentals and characteristics.
- The fundamentals to be considered depend on the analyst's approach to valuation.

top- down approach

- an analyst examines the economic environment,
- identifies sectors that are expected to prosper in that environment

bottom- up approach

- analyzes securities of companies from previously identified attractive sectors.
- an analyst typically follows an industry or industries and forecasts fundamentals for the companies in those industries in order to determine valuation.

1.1 Estimated value and Market price

By comparing estimates of value and market price, an analyst can arrive at one of three conclusions:

1. If the estimated value exceeds the market price, the analyst infers the security is undervalued.
2. If the estimated value equals the market price, the analyst infers the security is fairly valued.
3. If the estimated value is less than the market price, the analyst infers the security is overvalued.

- Analysts must cope with uncertainties related to model appropriateness and the correct value of inputs. An analyst's final conclusion depends not only on the comparison of the estimated value and the market price but also on the analyst's confidence in the estimated value (i.e., in the model selected and the inputs used in it).

- Confidence in the convergence of the market price to the intrinsic value over the investment time horizon relevant to the objectives of the portfolio must also be taken into account before an analyst acts on an apparent mispricing or makes a buy, sell, or hold recommendation: The ability to benefit from identifying a mispriced security depends on the market price converging to the estimated intrinsic value.

- Analysts often use a variety of models and inputs to achieve greater confidence in their estimates of intrinsic value. The use of more than one model and a range of inputs also helps the analyst understand the sensitivity of value estimates to different models and inputs.

2 Major categories of Equity Valuation Models

- Present value models
- Multiplier models
- Asset- based valuation models.

2 Major categories of Equity Valuation Models

1. **Present value models (synonym: discounted cash flow models).**

- These models estimate the intrinsic value of a security as the present value of the future benefits expected to be received from the security.
- In present value models, benefits are often defined in terms of cash expected to be distributed to shareholders (dividend discount models) or in terms of cash flows available to be distributed to shareholders after meeting capital expenditure and working capital needs (free- cash- flow- to- equity models).

2 Major categories of Equity Valuation Models

2. Multiplier models (synonym: market multiple models).

These models are based chiefly on share price multiples or enterprise value multiples.

- share price multiples
  - This model estimates intrinsic value of a common share from a price multiple for some fundamental variable, such as revenues, earnings, cash flows, or book value.
  - The fundamental variable may be stated on a forward basis (e.g., forecasted EPS for the next year) or a trailing basis (e.g., EPS for the past year), as long as the usage is consistent across companies being examined.

- enterprise value multiples.
  - The multiples have the form (Enterprise value)/(Value of a fundamental variable).
  - Enterprise value, the numerator, is a measure of a company's total market value from which cash and short – term investments have been subtracted.
  - An estimate of common share value can be calculated indirectly from the EV multiple; the value of liabilities and preferred shares can be subtracted from the EV to arrive at the value of common equity

2 Major categories of Equity Valuation Models

3. Asset- based valuation models

- These models estimate intrinsic value of a common share from the estimated value of the assets of a corporation minus the estimated value of its liabilities and preferred shares.
- The estimated market value of the assets is often determined by making adjustments to the book value (synonym: carrying value) of assets and liabilities.
- The theory underlying the asset- based approach is that the value of a business is equal to the sum of the value of the business's assets.

2.1 Choice of model

Analysts recognize that each model is a simplification of the real world and that there are uncertainties related to model appropriateness and the inputs to the models.

The choice of model(s) will depend on:

1. The availability of information to input into the model(s)
2. The analyst's confidence in the information
3. In the appropriateness of the model(s).

Question

An analyst is estimating the intrinsic value of a new company. The analyst has one year of financial statements for the company and has calculated the average values of a variety of price multiples for the industry in which the company operates.
The analyst plans to use at least one model from each of the three categories of valuation models.

The analyst is least likely to rely on the estimate(s) from the:

A. Multiplier model(s).
B. Present value model(s).
C. Asset- based valuation model(s).

Solution

B is correct. Because the company has only one year of data available, the analyst is least likely to be confident in the inputs for a present value model. The values on the balance sheet, even before adjustment, are likely to be close to market values because the assets are all relatively new. The multiplier models are based on average multiples from the industry.

3 The Dividend Discount Model

There are two sources of return from investing in equities:

(1) cash dividends received by an investor over his or her holding period

(2) the change in the market price of equities over that holding period.

A dividend is a distribution paid to shareholders based on the number of shares owned, and a cash dividend is a cash distribution made to a company's shareholders.

Two types of dividends:

1. Cash dividends are typically paid out regularly at known intervals; such dividends are known as regular cash dividends.
2. an extra dividend or special dividend is a dividend paid by a company that does not pay dividends on a regular schedule or a dividend that supplements regular cash dividends with an extra payment.

3 The Dividend Discount Model

Dividend discount models address discounting expected cash dividends.

1. **A stock dividend** (also known as a bonus issue of shares) is a type of dividend in which a company distributes additional shares of its common stock (typically, 2%–10% of the shares then outstanding) to shareholders instead of cash. Stock dividends are not relevant for valuation.
2. **A stock split** involves an increase in the number of shares outstanding with a consequent decrease in share price.
3. **A reverse stock split** involves a reduction in the number of shares outstanding with a corresponding increase in share price. In a one- for- two reverse stock split, each shareholder would receive one new share for every two old shares held, thereby reducing the number of shares outstanding by half.
4. **A share repurchase (or buyback)** is a transaction in which a company uses cash to buy back its own shares.

3.1 Procedure of dividend payment

The payout of regular cash dividends to common shareholders follows a fairly standard chronology that is set in motion once the company's board of directors votes to pay the dividend.

1. Declaration date – the day that the company issues a statement declaring a specific dividend.
2. Ex- dividend date – the first date that a share trades without (i.e., "ex") the dividend.
3. Holder- of- record date – the date that a shareholder listed on the company's books will be deemed to have ownership of the shares for purposes of receiving the upcoming dividend.
4. Payment date – the day that the company actually mails out (or electronically transfers) a dividend payment to shareholders.

3.2 Description/ formula

If the issuing company is assumed to be a going concern, the intrinsic value of a share is the present value of expected future dividends. If a constant required rate of return is also assumed, then the DDM expression for the intrinsic value of a share is :

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

Where,
V_o = value of a share of stock today, at t = 0
D_t = expected dividend in year t, assumed to be paid at the end of the year
r = required rate of return on the stock

Using summation notation to represent the present value of the n expected dividends, we arrive at the general expression for an n-period holding period or investment horizon:

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

Question

For the next three years, the annual dividends of a stock are expected to be €2.00, €2.10, and €2.20. The stock price is expected to be €20.00 at the end of three years. If the required rate of return on the shares is 10 percent, what is the estimated value of a share?

Solution

The present values of the expected future cash flows can be written as follows:

$$V_0 = \frac{2.00}{(1.10)^1} + \frac{2.10}{(1.10)^2} + \frac{2.20}{(1.10)^3} + \frac{20.00}{(1.10)^3}$$

Calculating and summing these present values gives an estimated share value of:
$V_0 = 1.818 + 1.736 + 1.653 + 15.026 = €20.23$.

The three dividends have a total present value of €5.207, and the terminal stock value has a present value of €15.026, for a total estimated value of €20.23.

3.3 Determining the rate of return in DDM

How is the required rate of return for use in present value models estimated?
To estimate the required rate of return on a share, analysts frequently use the capital asset pricing model (CAPM):

Required rate of return on share i = Current expected risk – free rate of return + $Beta_i$ × Market equity risk premium

The required rate of return on a share is the sum of the current expected risk- free rate plus a risk premium that equals the product of the stock's beta (a measure of non- diversifiable risk) and the market risk premium (the expected return of the market in excess of the risk- free return, where in practice, the "market" is often represented by a broad stock market index).

Other common methods for estimating the required rate of return for the stock of a company include adding a risk premium that is based on economic judgments, to an appropriate risk- free rate (usually a government bond) and adding a risk premium to the yield on the company's bonds.

3.4 Preferred Stock Valuation

Preferred stock is a form of equity (generally, non- voting) that has priority over common stock in the receipt of dividends and on the issuer's assets in the event of a company's liquidation

General dividend discount models are relatively easy to apply to preferred shares.

For a non- callable, non- convertible perpetual preferred share paying a level dividend D and assuming a constant required rate of return over time, Equation 1 reduces to the formula for the present value of a perpetuity. Its value is:

$$V_0 = \frac{D_0}{r}$$

For a non- callable, non- convertible preferred stock with maturity at time n, the estimated intrinsic value can be estimated by using the preferred stock's par value, F, instead of Pn:

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

3.4 Preferred Stock Valuation

Preferred stock issues are frequently callable (redeemable) by the issuer at some point prior to maturity, often at par value or at prices in excess of par value that decline to par value as the maturity date approaches.

Preferred stock issues can also include a retraction option that enables the holder of the preferred stock to sell the shares back to the issuer prior to maturity on pre – specified terms.

Question

The following facts concerning the Union Electric Company 4.75 percent perpetual preferred shares are as follows:

Issuer: Union Electric Co. (owned by Ameren)
Par value: US$100
Dividend: US$4.75 per year
Maturity: perpetual
Embedded options: none
Credit rating: Moody's Investors Service/Standard & Poor's Ba1/BB
Required rate of return on Ba1/BB rated preferred shares as of valuation date: 7.5 percent.

A. Estimate the intrinsic value of this preferred share.
B. Explain whether the intrinsic value of this issue would be higher or lower if the issue were callable (with all other facts remaining unchanged).

Solution

Solution to A:
Basing the discount rate on the required rate of return on Ba1/BB rated preferred shares of 7.5 percent gives an intrinsic value estimate of US$4.75/0.075 = US$63.33.

Solution to B:
The intrinsic value would be lower if the issue were callable. The option to redeem or call the issue is valuable to the issuer because the call will be exercised when doing so is in the issuer's interest. The intrinsic value of the shares to the investor will typically be lower if the issue is callable. In this case, because the intrinsic value without the call is much less than the par value, the issuer would be unlikely to redeem the issue if it were callable; thus, callability would reduce intrinsic value, but only slightly.

4 The Gordon Growth Model

The Gordon (constant) growth model (Gordon, 1962) is a simple and well- recognized DDM. The model assumes dividends grow indefinitely at a constant rate.

The Gordon growth model is particularly appropriate for valuing the equity of dividend- paying companies that are relatively insensitive to the business cycle and in a mature growth phase.

With a constant growth assumption, where g is the constant growth rate:

$$V_0 = \sum_{t=1}^{\infty} \frac{D_0(1+g)^t}{(1+r)^t} = D_0 \left[\frac{(1+g)}{(1+r)} + \frac{(1+g)^2}{(1+r)^2} + \ldots + \frac{(1+g)^{\infty}}{(1+r)^{\infty}} \right]$$

If required return r is assumed to be strictly greater than growth rate g, then the square- bracketed term in above formula is an infinite geometric series and sums to [(1 + g)/(r – g)].

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

4 The Gordon Growth Model

The assumptions of the Gordon model are as follows:

1. Dividends are the correct metric to use for valuation purposes.
2. The dividend growth rate is forever: It is perpetual and never changes.
3. The required rate of return is also constant over time.
4. The dividend growth rate is strictly less than the required rate of return.

Limitations:

1. The equities being examined might not currently pay a dividend.
2. The Gordon assumptions might be too simplistic to reflect the characteristics of the companies being evaluated.

Some alternatives to using the Gordon model are as follows:

1. Use a more robust DDM that allows for varying patterns of growth.
2. Use a cash flow measure other than dividends for valuation purposes.
3. Use some other approach (such as a multiplier method) to valuation.

4 The Gordon Growth Model

Applying a DDM is difficult if the company being analyzed is not currently paying a dividend.
An analyst might still use a DDM to value such companies by assuming that dividends will begin at some future point in time. The analyst might further assume that constant growth occurs after that date and use the Gordon growth model for valuation.

5 Multistage Dividend Discount Models

Multistage growth models are often used to model rapidly growing companies.

The two- stage DDM thus makes use of two growth rates:

1. A high growth rate initially as the company is assumed to experience an initial, finite period of high growth,
2. A lower, sustainable growth rate prior to the entry of competitors.

The two- stage valuation model is similar to Gordon Growth Model with no dividends except that instead of assuming zero dividends for the initial period, the analyst assumes that dividends will exhibit a high rate of growth during the initial period.

5 Multistage Dividend Discount Models

The following equation values the dividends over the short- term period of high growth and the terminal value at the end of the period of high growth. The short- term growth rate, g_s, lasts for n years. The intrinsic value per share in year n, V_n, represents the year n value of the dividends received during the sustainable growth period or the terminal value at time n.

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

V_n can be estimated by using the Gordon growth model as shown in the following equation , where g_L is the long- term or sustainable growth rate.

$$V_n = \frac{D_{n+1}}{r - g_L}$$

The dividend in year n + 1, Dn+1, can be determined by using Equation : $D_{n+1} = D_0(1+g_S)^n(1+g_L)$

Question

The current dividend, D0, is $5.00. Growth is expected to be 10 percent a year for three years and then 5 percent thereafter. The required rate of return is 15 percent. Estimate the intrinsic value.

Solution

D1 = \$5.00(1 + 0.10) = \$5.50
D2 = \$5.00(1 + 0.10)^{2} = \$6.05
D3 = \$5.00(1 + 0.10)^{3} = \$6.655
D4 = \$5.00(1 + 0.10)^{3} (1 + 0.05) = \$6.98775

$$V_3 = \frac{\$6.98775}{0.15 - 0.05} = \$69.8775$$

$$V_0 = \frac{5.5}{(1+0.15)} + \frac{6.05}{(1+0.15)^2} + \frac{6.655}{(1+0.15)^3} + \frac{69.8775}{(1+0.15)^3} = \$59.68$$

5 Multistage Dividend Discount Models

Practitioners assume growth will ultimately fall into three stages:

1) growth,
2) transition,
3) maturity.

This assumption supports the use of a three stage DDM, which makes use of three growth rates:

1. A high growth rate for an initial finite period, followed by
2. A lower growth rate for a finite second period,
3. A lower, sustainable growth rate into perpetuity.

6 Multiplier Models

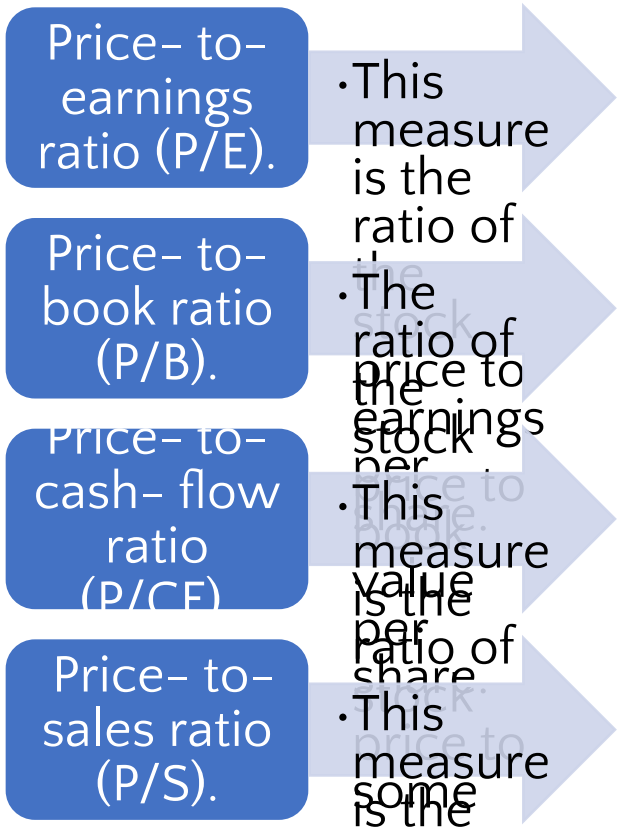
- The term price multiple refers to a ratio that compares the share price with some sort of monetary flow or value to allow evaluation of the relative worth of a company's stock.

- If the ratio falls below a specified value, the shares are identified as candidates for purchase, and if the ratio exceeds a specified value, the shares are identified as candidates for sale.

- Many practitioners use ratios when examining a group or sector of stocks and consider the shares for which the ratio is relatively low to be attractively valued securities.

6 Multiplier Models

Price multiples that are used by security analysts include the following:



A common criticism of these multiples is that they do not consider the future.

1.2 Price Multiples, Present Value Models, and Fundamentals

6.1 The Method of Comparables

- The method of comparables is the most widely used approach for analysts reporting valuation judgments on the basis of price multiples.
- This method essentially compares relative values estimated using multiples or the relative values of multiples.
- The economic rationale underlying the method of comparables is the law of one price: Identical assets should sell for the same price.
- The methodology involves using a price multiple to evaluate whether an asset is fairly valued, undervalued, or overvalued in relation to a benchmark value of the multiple.
- Choices for the benchmark multiple include the multiple of a closely matched individual stock or the average or median value of the multiple for the stock's industry. Some analysts perform trend or time- series analyses and use past or average values of a price multiple as a benchmark.
- Identifying individual companies or even an industry as the "comparable" may present a challenge.

Case study

Incorporated in the Netherlands, Airbus is active in the aerospace and defense industry. It is a dominant aerospace company in Europe. Its largest business, Airbus Commercial Aircraft, is a manufacturing company with bases in several European countries and accounts for the majority of Airbus SE profits. Airbus and its primary competitor, Boeing, control most of the global commercial airplane industry.

Comparisons are frequently made between Airbus and Boeing. As noted in the table below , the companies are broadly similar in size as measured by total revenues. Converting total forecast revenues from euros to US dollars using the average exchange rate for 2017 of US$1.13/€ results in a value of $75.5 billion for Airbus's total revenues. Thus, total revenues for Boeing are expected to be about a fifth higher than those for Boeing.

The companies do differ, however, in several important areas. Airbus derives a greater share of its revenue from commercial aircraft production than does Boeing, and the order backlog for Airbus is much higher than that for Boeing. Converting the Airbus order backlog from euros to US dollars using the quarter- end rate for September 2017 of $1.1813/€ results in a value of $1.12 billion for Airbus's order backlog. Thus, the order backlog for Airbus is more than twice as high as the backlog for Boeing.

Case study

	Airbus	Boeing
Total revenues (billions, 2017)	€66.8	$92.2
Annual revenue growth (2015–2017 average)	1.8%	–2.1%
Percent of revenues from commercial aircraft	75%	69%
Order backlog (billions)	€945	$474
Share price, 12/Dec/17	€86.96	$283.73
EPS (basic)	€3.33	$10.18
DPS	€1.48	$5.7
Dividend payout ratio	44%	56%
P/E ratio	26.1	27.9

What data given above support a higher P/E for Boeing than for Airbus?

Solution

P/E is directly related to the payout ratio and the dividend growth rate. The P/E is inversely related to the required rate of return. The only data presented in the table above that support a higher P/E for Boeing is the company's higher dividend payout ratio (expected at 56 percent versus 44 percent for Airbus).
The following implicitly supports a higher P/E for Airbus: Airbus has higher revenue growth (as reported for 2016 and expected for 2017) and a higher backlog of orders, suggesting that it may have a higher future growth rate.

7 Enterprise Value

Enterprise value is most frequently determined as market capitalization plus market value of preferred stock plus market value of debt minus cash and investments (cash equivalents and short- term investments).

Enterprise value is often viewed as the cost of a takeover: In the event of a buyout, the acquiring company assumes the acquired company's debt but also receives its cash. Enterprise value is most useful when comparing companies with significant differences in capital structure.

In practice, analysts may have difficulty accurately assessing enterprise value if they do not have access to market quotations for the company's debt.

8 Asset- based valuation

- An asset- based valuation of a company uses estimates of the market or fair value of the company's assets and liabilities.
- Asset- based valuations work well for companies that do not have a high proportion of intangible or "off the books" assets and that do have a high proportion of current assets and current liabilities.
- Asset- based valuation models are frequently used together with multiplier models to value private companies.
- As public companies increase reporting or disclosure of fair values, asset- based valuation may be increasingly used to supplement present value and multiplier models of valuation.

8 Asset- based valuation

Important facts that the practitioner should realize are as follows:

- Companies with assets that do not have easily determinable market (fair) values—such as those with significant property, plant, and equipment—are very difficult to analyze using asset valuation methods.
- Asset and liability fair values can be very different from the values at which they are carried on the balance sheet of a company.
- Some assets that are “intangible” are shown on the books of the company. Other intangible assets, such as the value from synergies or the value of a good business reputation, may not be shown on the books. Because asset- based valuation may not consider some intangibles, it can give a “floor” value for a situation involving a significant amount of intangibles. When a company has significant intangibles, the analyst should prefer a forward- looking cash flow valuation.
- Asset values may be more difficult to estimate in a hyper- inflationary environment.

Question

Company data for dividend per share (DPS), earnings per share (EPS), share price, and price- to- earnings ratio (P/E) for the most recent five years are presented in Exhibit 11. In addition, estimates (indicated by an "E" after the amount) of DPS and EPS for the next five years are shown. The valuation date is at the end of Year 5. The company has 1,000 shares outstanding.

Year	DPS	EPS	Share Price	TTM P/E
10	$3.10E	$5.20E	—	—
9	$2.91E	$4.85E	—	—
8	$2.79E	$4.65E	—	—
7	$2.65E	$4.37E	—	—
6	$2.55E	$4.30E	—	—
5	$2.43	$4.00	$50.80	12.7
4	$2.32	$3.90	$51.48	13.2
3	$2.19	$3.65	$59.86	16.4
2	$2.14	$3.60	$54.72	15.2
1	$2.00	$3.30	$46.20	14.0

Question

Cash	$ 5,000
Accounts receivable	15,000
Inventories	30,000
Net fxed assets	50,000
Total assets	$100,000
Accounts payable	$ 3,000
Notes payable	17,000
Term loans	25,000
Common shareholders' equity	55,000
Total liabilities and equity	$100,000

Question

1. Using a Gordon growth model, estimate intrinsic value. Use a discount rate of 10 percent and an estimate of growth based on growth in dividends over the next five years.

2. Using a multiplier approach, estimate intrinsic value. Assume that a reasonable estimate of P/E is the average trailing twelve- month (TTM) P/E ratio over Years 1 through 4.

3 .Using an asset- based valuation approach, estimate value per share from adjusted book values. Assume that the market values of accounts receivable and inventories are as reported, the market value of net fixed assets is 110 percent of reported book value, and the reported book values of liabilities reflect their market values.

Solution

Solution 1:

$$D_5 (1 + g)^5 = D_{10} 2.43(1 + g)^5 = 3.10$$

$$g \approx 5.0\%$$

$$\text{Estimate of value} = V_5 = 2.55/(0.10 - 0.05) = \$51.00$$

Solution 2:

$$\text{Average P/E} = (14.0 + 15.2 + 16.4 + 13.2)/4 = 14.7$$

$$\text{Estimate of value} = \$4.00 \times 14.7 = \$58.80$$

Solution

Solution 3:

Market value of assets = 5,000 + 15,000 + 30,000 + 1.1(50,000) = $105,000
Market value of liabilities = $3,000 + 17,000 + 25,000 = $45,000
Adjusted book value = $105,000 – 45,000 = $60,000
Estimated value (adjusted book value per share) = $60,000 ÷ 1,000 shares = $60.00

Given the current share price of $50.80, the multiplier and the asset- based valuation approaches indicate that the stock is undervalued. Given the intrinsic value estimated using the Gordon growth model, the analyst is likely to conclude that the stock is fairly priced. The analyst might examine the assumptions in the multiplier and the asset- based valuation approaches to determine why their estimated values differ from the estimated value provided by the Gordon growth model and the market price.