The Value of Common Stocks

How Common Stocks Are Traded

- **Primary Market: underwriting**

  → Sales of shares to raise new capital are said to occur in the *primary market.*

  - *Venture capital:* A company issues shares to specialist investment partnership, investment institutions and wealthy individuals.
  - *Initial Public Offering (IPO):* A company issues shares to general public for the first time (i.e., going public)
  - *Secondary Offering:* A public company issues additional shares.
  - Stock issuing is usually organized by an investment bank who acts as an underwriter: it buys the whole issue and resells it to the public.
- **Secondary Market: Resale market**

  → Stock exchanges are really markets for secondhand shares, but they prefer to describe themselves as *secondary markets,* which sounds more important.

  - Exchanges: NYSE, Tokyo Stock Exchange, Shanghai Stock Exchange, etc.
  - OTC: NASDAQ, NEEQ

    → Markets where there is no organized exchange and the assets are traded by a network of dealers, are known as *over- the-counter (OTC)* markets
  - Trading in secondary market
    - Trading costs: commission, bid-ask spread, price impact
    - Buy on margin, short sale
    - Long and short

Trading Results for GE

Market capitalization:

$$Market\ capitalization\ (market\ cap) = number\ of\ shares\ outstanding \times share\ price$$

Most of the trading on the NYSE and Nasdaq is in ordinary common stocks, but other securities are traded also, including preferred shares and warrants.

Investors can also choose from hundreds of *exchange-traded funds* (ETFs), which are portfolios of stocks that can be bought or sold in a single trade.

How Common Stocks Are Valued

$$PV(share\ of\ stock) = PV(expected\ future\ dividends\ per\ share)$$

If you own a share of common stock, your **cash payoff comes in two forms**:

1. *cash dividends*
2. *capital gains or losses*

Potential cash flows: dividend & sale of stock

Suppose that the current price of a share is P_0, that the expected price at the end of a year is P_1, and that the expected dividend per share is DIV_1.

$$Expected\ return = r = \frac{DIV_1 + P_1 - P_0}{P_0} = \frac{P_1 - P_0}{P_0} + \frac{DIV_1}{P_0}$$

→ $\frac{P_1 - P_0}{P_0}$: **capital gain rate**; $\frac{DIV_1}{P_0}$: **dividend yield**

Total return = capital gain rate + dividend yield

The expected total return of the stock should equal the expected return of other investments available in the market with equivalent risk.

$$Price = P_0 = \frac{DIV_1 + P_1}{1 + r}$$

→ *Market equilibrium*

- If the current stock price were **less** than this amount, expect investors to rush in and buy it, **driving up** the stock's price.
- If the stock price **exceeded** this amount, selling it would cause the stock price to quickly **fall**.

A general stock price formula:

$$\begin{aligned} P_0 &= \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \ldots + \frac{DIV_H + P_H}{(1+r)^H} \\ &= \sum_{t=1}^{H} \frac{DIV_t}{(1+r)^t} + \frac{P_H}{(1+r)^H} \end{aligned}$$

Note that the above equation *holds for any horizon N*. Thus all investors (with the same beliefs) will attach the same value to the stock, *independent of their investment horizons*.

The price of any stock is equal to the present value of the expected future dividends it will pay.

What is the discount rate, r, in this calculation?

It's called the **market capitalization rate** or **cost of equity capital,** which are just alternative names for the opportunity cost of capital, defined as the expected return on other securities with the same risks as the shares.

In principle, the horizon period *H* could be **infinitely** distant. As *H* approaches infinity, the present value of the terminal price ought to approach zero.

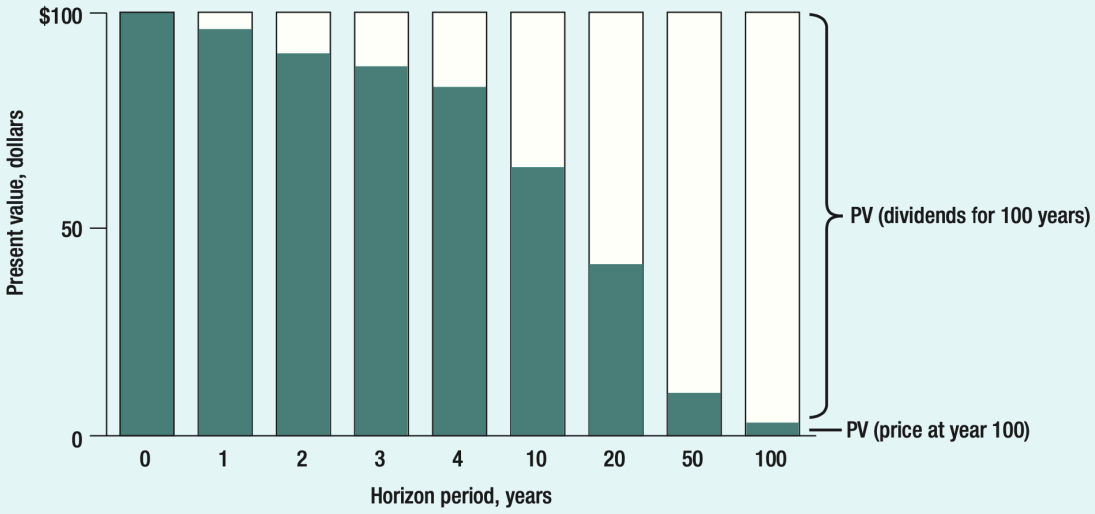

FIGURE 4.1

As your horizon recedes, the present value of the future price (shaded area) declines but the present value of the stream of dividends (unshaded area) increases. The total present value (future price and dividends) remains the same.

The **DCF** or **dividend discount model (DDM)** of stock prices:

$$P_0 = \sum_{t=1}^{\infty} \frac{DIV_t}{(1+r)^t}$$

→ The formula was *derived* from the **assumption** that price in any period is determined by expected dividends *and* capital gains over the next period, and *expected rates of return for all horizons* are **the same and constant** over time..

Notice that it is **not correct** to say that the value of a share is equal to the sum of the discounted stream of **earnings per share**. Earnings are generally **larger** than dividends because part of those earnings is reinvested in new plant, equipment, and working capital.

Why would a successful company decide not to pay cash dividends?

1. A growing company may maximize value by investing all its earnings rather than paying out any. The shareholders are better off with this policy, provided that the investments offer an expected rate of return **higher** than shareholders could get by investing on their own. In other words, shareholder value is maximized if the firm invests in projects that can earn more than the

opportunity cost of capital.

2. A company may pay out cash not as dividends but **by repurchasing shares** from stockholders.

Estimating the Cost of Equity Capital

When the stock's *expected* dividends grow at a constant rate:

$$P_0 = \frac{DIV_1}{r - g}$$

→ **Gordon Growth Model**

*Remember that we can use this formula only when g, the anticipated growth rate, is **less** than r, the discount rate.*

$$r = \frac{DIV_1}{P_0} + g$$

→ The expected return equals the **dividend yield (DIV1/*P*0)** plus **the expected rate of growth in *dividends* (*g*)**.

→ DDM with constant growth gives a relation between current stock price, current dividend, dividend growth rate and the expected return. Knowing three of the variables, we can determine the fourth.

Growth rate g is the growth rate of book value, not EPS!

We can't use model unless

1. *g* < *r*
2. g is expected to be *constant forever*

   → Because g must be a long-term growth rate, it cannot be higher than r.

Application of Gordon Growth Model

- Works best for:
  - firms with *stable growth rates*
  - firms which pay out *dividends that are high and approximate Free Cash Flow*
  - firms with *stable leverage*
- Some obvious candidates for the Gordon Growth Model:
  - Regulated Companies, such as utilities
  - Large financial service companies
  - REITs (Real estate investment trusts)
  - Overall Market

Using the DCF Model to Set Gas and Electricity Prices

A fair rate of return: Usually interpreted as *r,* **the market capitalization rate for the firm's common stock**.

→ *The fair rate of return on equity ought to be the cost of equity, that is, the rate offered by securities that have the same risk as the utility's common stock.*

How to estimate *g,* the expected rate of dividend growth:

1. consult the views of security analysts
2. to estimate long-run growth starts with the payout ratio

If a firm elects to pay a lower dividend, and reinvest the funds, the stock price may **increase** because future dividends may be higher.

Payout ratio (p): Fraction of earnings paid out as dividends, that is, the ratio of dividends to earnings per share (EPS).

$$Payout\ ratio = \frac{DIV}{EPS}$$

Plowback ratio (b): Fraction of earnings retained by the firm.

$$Plowback\ ratio = 1 - payout\ ratio = 1 - \frac{DIV}{EPS}$$

Return on equity, or **ROE**: Ratio of earnings per share to book equity per share.

$$Return\ on\ equity = ROE = \frac{EPS}{book\ equity\ per\ share}$$

$$Dividend\ growth\ rate = g = plowback\ ratio \times ROE$$

Dangers Lurk in Constant-Growth Formulas

DCF Models with Two Stages of Growth

In real life the return on equity will decline gradually over time, and no firms can always grow at a quite rapid speed.

2 stage growth model of DDM works best for firms where the growth rate is not yet stable, but is moderating.

EXAMPLE

Consider Growth-Tech, Inc., a firm with $DIV_1 = \$0.50$ and $P_0 = \$50$. The firm has plowed back 80% of earnings and has had a return on equity (ROE) of 25%. This means that *in the past*

$$Dividend\ growth\ rate = plowback\ ratio \times ROE = 0.80 \times 0.25 = 0.20$$

Assume the ROE suddenly drops to 16% at **year 3** and the firm responds by plowing back only 50% of earnings. Then g drops to 0.50 × 0.16 = 0.08.

Growth-Tech starts **year 1** with book equity of $10.00 per share. It earns $2.50, pays out 50 cents as dividends, and plows back $2. Thus it starts **year 2** with book equity of $10 + 2 = $12. After another year at the same ROE and payout, it starts **year 3** with equity of $14.40.

However, ROE drops to 0.16, and the firm earns only $2.30. Dividends go up to $1.15, because the payout ratio increases, but the firm has only $1.15 to plow back. Therefore subsequent growth in earnings and dividends drops to 8%.

Investors in **year 3** will view Growth-Tech as offering 8% per year dividend growth.

	Year			
	1	2	3	4
Book equity	10.00	12.00	14.40	15.55
Earnings per share (EPS)	2.50	3.00	2.30	2.48
Return on equity (ROE)	0.25	0.25	0.16	0.16
Payout ratio	0.20	0.20	0.50	0.50
Dividends per share (DIV)	0.50	0.60	1.15	1.24
Growth rate of dividends (%)	—	20	92	8

TABLE 4.4 **Forecasted earnings and dividends for Growth-Tech. Note the changes in year 3: ROE and earnings drop, but payout ratio increases, causing a big jump in dividends. However, subsequent growth in earnings and dividends falls to 8% per year. Note that the increase in equity equals the earnings not paid out as dividends.**

Investors in year 3 will view Growth-Tech as offering 8% per year dividend growth. So we can use the constant-growth formula to calculate P_3:

$$P_3 = \frac{DIV_4}{r - 0.08}$$

$$P_0 = \frac{DIV_1}{1+r} + \frac{DIV_2}{(1+r)^2} + \frac{DIV_3}{(1+r)^3} + \frac{1}{(1+r)^3} \times \frac{DIV_4}{r - 0.08}$$

$$= \frac{0.50}{1+r} + \frac{0.60}{(1+r)^2} + \frac{1.15}{(1+r)^3} + \frac{1}{(1+r)^3} \times \frac{1.24}{r - 0.08} = \$50$$

$$\rightarrow r = 0.099$$

Our present value calculations for Growth-Tech used **a *two-stage* DCF valuation model**:

- **In the first stage (years 1 and 2)**, Growth-Tech is highly profitable (ROE = 25%), and it plows back 80% of earnings. Book equity, earnings, and dividends increase by 20% per year.
- **In the second stage, starting in year 3**, profitability and plowback decline, and earnings settle into long-term growth at 8%. Dividends jump up to $1.15 in year 3, and then also grow at 8%.

DDM with Multiple Growth

Firms often evolve through different stages in its growth. For example, some have **three stages** during their lifetime:

1. **Growth stage:** rapidly expanding sales, high profit margins, and abnormally high growth in earnings, many new investment opportunities.
2. **Transition stage:** growth rate and profit margin reduced by competition, fewer new investment opportunities.
3. **Maturity stage:** earning growth and average return stabilizes for the remaining life of the firm.

The Link Between Stock Price and Earnings per Share

Investors separate **growth stocks** from **income stocks**.

- They buy **growth stocks** primarily for the expectation of capital gains, and they are interested in the future growth of earnings rather than in next year's dividends.
- They buy **income stocks** primarily for the cash dividends.

If all the earnings are paid out as dividends, the expected return will be equal to the earnings per share divided by the share price (i.e., the earnings–price ratio). The expected return for *growing* firms can also equal the earnings–price ratio. The key is whether earnings are reinvested to provide a return equal to the market capitalization rate.

The earnings–price ratio, measured in terms of EPS_1, next year's expected earnings, equals the market capitalization rate (*r*) *only* when the new project's NPV = 0.

- Earnings-price ratio > r: NPV < 0
- Earnings-price ratio = r: NPV = 0
- Earnings-price ratio < r: NPV > 0

The **net present value of growth opportunities**, or **PVGO**:

$$P_0 = \frac{EPS_1}{r} + PVGO$$

The **earnings–price ratio**, therefore, equals

$$\frac{EPS_1}{P_0} = r\left(1 - \frac{PVGO}{P_0}\right)$$

→ It will **underestimate** *r* if **PVGO is positive** and **overestimate** it if **PVGO is negative** if confusing earnings-price ratio with *r.*

Calculating the Present Value of Growth Opportunities for Fledgling Electronics

EXAMPLE

Fledgling's market capitalization rate, *r*, is 15%. The company is expected to pay a dividend of $5 in the first year, and thereafter the dividend is predicted to increase indefinitely by 10% a year.

$$P_0 = \frac{\$5}{0.15 - 0.10} = \$100$$

Suppose that Fledgling has earnings per share of $EPS_1 = \$8.33$. Its payout ratio is then

$$Payout\ ratio = \frac{DIV_1}{EPS_1} = \frac{5.00}{8.33} = 0.6$$
$$Plowback\ ratio = 1 - 0.6 = 0.4$$

Suppose also that Fledgling's ratio of earnings to book equity is ROE = 0.25. This explains the growth rate of 10%:

$$Growth\ rate = g = plowback\ ratio \times ROE = 0.4 \times 0.25 = 0.10$$

The capitalized value of Fledgling's earnings per share if it had a no-growth policy would be

$$\frac{EPS_1}{r} = \frac{\$8.33}{0.15} = \$55.56$$

The value of Fledgling stock is $100. The difference of $44.44 must be the amount that investors are paying for growth opportunities.

Each year Fledgling plows back 40% of its earnings into new assets.

$$Earnings\ plowed\ back = EPS_1 \times plowback\ rate = \$8.33 \times 0.4 = \$3.33 = EPS_1 - DIV_1$$

In the first year Fledgling invests $3.33 at a **permanent** 25% return on equity.

$$Cash\ generated\ by\ earnings\ plowed\ back = \$3.33 \times 0.25 = \$0.83$$
$$NPV_1 = -\$3.33 + \frac{\$0.83}{0.15} = \$2.22$$

Thus the cash generated by this investment is 0.25 × 3.33 = $0.83 per year **starting at *t* = 2**. The net present value of the investment as of *t* = 1 is $2.22.

Everything is the same **in year 2** except that Fledgling will invest $3.67, 10% more than in year 1 *(remember g = .10)*. Therefore **at *t* = 2** an investment is made with a net present value of

$$Earnings\ plowed\ back = \$3.33 \times (1 + 0.1) = \$3.67$$
$$Cash\ generated\ by\ earnings\ plowed\ back = \$3.67 \times 0.25 = \$0.92$$
$$NPV_2 = -\$3.67 + \frac{\$0.92}{0.15} = \$2.44$$

Thus **the payoff to the owners** of Fledgling Electronics stock can be represented as **the sum of**:

1. *a level stream of earnings*, which could be paid out as **cash dividends** if the firm **did not grow**

$$Present\ value\ of\ level\ stream\ of\ earnings = \frac{EPS_1}{r} = \frac{\$8.33}{0.15} = \$55.56$$

2. *a set of tickets*, one for each future year, representing **the opportunity to make investments having positive NPVs**

$$Present\ value\ of\ growth\ opportunities = PVGO = \frac{NPV_1}{r-g} = \frac{\$2.22}{0.15-0.10} = \$44.44$$

Now everything checks:

$$Share\ price = Present\ value\ of\ level\ stream\ of\ earnings + Present\ value\ of\ growth\ opportunities$$
$$= \frac{EPS_1}{r} + PVGO = \$55.56 + \$44.44 = \$100$$

- **Earning yield:** $\frac{E}{P} = \frac{EPS_1}{P_0}$
- **P/E ratio:** $\frac{P}{E} = \frac{P_0}{EPS_1}$

  → Price per share divided by earnings per share.

Why is Fledgling Electronics a growth stock?

- It is expanding at 10% per year.
- The net present value of its future investments accounts for a significant fraction (about 44%) of the stock's price

Today's stock price reflects investor expectations about the earning power of the firm's current and *future* assets.

Growth Opportunities

Growth opportunities are investment that earn returns higher than the required rate of return on capital.

- The following **may not be** growth stocks
  - A stock with growing EPS
  - A stock with growing dividends
  - A stock with growing assets
- The following **may be** growth stocks
  - A stock with EPS growing slower than cost of capital
  - A stock with DPS growing slower than cost of capital

Appendix

Common Stock Introduction

Introduction to Common Stock

- **Definition:** Common stock represents equity, an ownership position, in a corporation.
- **Payments** of common stock are dividends, which take different forms:
  - *Cash dividend:* Periodic cash distribution from the firm to the shareholders.
  - *Stock dividend (stock split)*
  - *Stock repurchase*
- Contrary to payments to bondholders, payments to common stockholders are uncertain in both magnitude and timing.
- Traded in **open markets** (public vs. private)

Characteristics of Common Stock

- **Residual claim:** common stockholders have claim to firm's cash flows and assets after all obligations to creditors and preferred stockholders are met.
- **Limited liability:** common stockholders may lose their investments, but no more.
- **Voting rights:** common stockholders are entitled to vote for the board of directors and on other matters.

EPS and ROE

Actually forecast of dividend often involves many practical issues.

Some Terminology:

- **Earnings Per Share(E or EPS):** Total profit net of depreciation and taxes divided by all shares outstanding
- **Retained Earnings:** Earnings – Dividends
- **Book Value (BV):** Net worth of the firm according to the balance sheet.

  (Cumulative retained earnings and Common stock)
- **Return on Equity (ROE):** Earnings / BV

Growth Stock and PE Ratio

Earning Yield vs. ROE

- **Earnings yield:**

E/P = Earning per share / Price per share = Net Income / Market Value of Equity

- Earning yield measure the rate of investment return from investor's perspective.

- **Return on Equity:**

  ROE = Net Income / Book value of Equity

  - ROE measure the rate of return from company's perspective.
  - Book value is the amount of capital that the company provide to managers.
  - The managers use this amount of capital to operate and earn money for company.

The investor buy stocks at transaction market, and the money paid to another investor. The managers received the money **only** when they issue stocks in primary market.

PVGO and P/E

Within the same industry, a company with higher P/E ratio indicates **higher growth rate**:

P/E = 1/ r + PVGO / EPS1

- If PVGO is negative, earnings yield is higher than expected rate of return.
- PVGO is positive only if ROE > r, that is, if the firm can earn more than its cost of capital.

Summary

Chapter 4

In this chapter we have used our newfound knowledge of **present values to examine the market price of common stocks**. **The value of a stock is equal to the stream of cash payments discounted at the rate of return that investors expect to receive on other securities with equivalent risks.**

Common stocks do not have a fixed maturity; their cash payments consist of an indefinite stream of dividends. Therefore, **the present value of a share of common stock is**

$$P_0 = \sum_{t=1}^{\infty} \frac{DIV_t}{(1+r)^t}$$

However, we did not just *assume* that investors purchase common stocks solely for dividends. In fact, we began with the assumption that investors have relatively short horizons and invest for both dividends and capital gains. Our fundamental valuation formula is, therefore,

$$P_0 = \frac{DIV_1 + P_1}{1+r}$$

This is a condition of **market equilibrium**. If it did not hold, the share would be overpriced or underpriced, and investors would rush to sell or buy it. The flood of sellers or buyers would force the price to adjust so that the fundamental valuation formula holds.

We also made use of the formula for a growing perpetuity presented in Chapter 2. If dividends are expected to grow forever at a constant rate of *g,* then

$$P_0 = \frac{DIV_1}{r - g}$$

It is often helpful to twist this formula around and use it to **estimate the market capitalization rate *r***, given P_0 and estimates of DIV_1 and *g:*

$$r = \frac{DIV_1}{P_0} + g$$

Remember, however, that this formula rests on **a *very* strict assumption**: ***constant* dividend growth in perpetuity**. This may be an acceptable assumption for mature, low-risk firms, but for many firms, near-term growth is unsustainably high. In that case, you may wish to use **a *two-stage* DCF formula**, where near-term dividends are forecasted and valued, and the constant-growth DCF formula is used to forecast the value of the shares at the start of the long run. The near-term dividends and the future share value are then discounted to present value.

The general DCF formula can be transformed into a statement about **earnings and growth opportunities**:

$$P_0 = \frac{EPS_1}{r} + PVGO$$

The ratio EPS1/*r* is the present value of the earnings per share that the firm would generate under *a no-growth policy*. PVGO is the *net present value of the investments* that the firm will make in order to grow. A growth stock is one for which *PVGO is large* relative to the present value of EPS, assuming no growth. Most growth stocks are stocks of rapidly expanding firms, but expansion alone ***does not*** create a high PVGO. **What matters is the profitability of the new investments.**

The dividend discount models derived in this chapter work best for mature firms that pay regular cash dividends. The models also work when companies pay out cash by share repurchases as well as dividends. That said, it is also true that the dividend discount model is difficult to use if the company pays no dividends at all or if the split of payout between cash dividends and repurchases is unpredictable. In that case, it is easier to get price per share by forecasting and valuing the company's total free cash flow and then dividing by the current number of shares outstanding.