Fundamentals of Corporate Finance, 2/e

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Chapter 9: Stock Valuation

Learning Objectives

1. LIST AND DESCRIBE THE FOUR TYPES OF SECONDARY MARKETS.
2. EXPLAIN WHY MANY FINANCIAL ANALYSTS TREAT PREFERRED STOCK AS A SPECIAL TYPE OF BOND RATHER THAN AS AN EQUITY SECURITY.
3. DESCRIBE HOW THE GENERAL DIVIDEND-VALUATION MODEL VALUES A SHARE OF STOCK.

Learning Objectives

4. DISCUSS THE ASSUMPTIONS THAT ARE NECESSARY TO MAKE THE GENERAL DIVIDEND-VALUATION MODEL EASIER TO USE AND USE THE MODEL TO COMPUTE THE VALUE OF A FIRM'S STOCK.
5. EXPLAIN WHY G MUST BE LESS THAN R IN THE CONSTANT-GROWTH DIVIDEND MODEL.

Learning Objectives

6. EXPLAIN HOW VALUING PREFERRED STOCK WITH A STATED MATURITY DIFFERS FROM VALUING PREFERRED STOCK WITH NO MATURITY AND CALCULATE THE PRICE OF A SHARE OF PREFERRED STOCK UNDER BOTH CONDITIONS.

The Market for Stocks

- BASIC FACTS
  - **Stocks are equity securities - certificates of ownership in a corporation**
  - **Households hold the largest share of equity securities, more than 36% of corporate equity**
  - **Pension funds are largest institutional investors in equities (21%), followed by mutual funds (20%), and foreign investors (10%)**

The Market for Stocks

- SECONDARY MARKETS
  - **Investors buy and sell previously issued securities among themselves**
  - **Provide marketability and fair prices for shares of stock**
  - **Firms receive higher prices for securities they issue in primary markets because investors are more willing to buy securities that are easy to resell in a secondary market**

Equity Valuation

- SECONDARY MARKETS AND EFFICIENCY
  - **In an efficient market, stock prices are updated constantly as new information reaches the market and is immediately incorporated into estimates of market values**

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **In a perfectly efficient market**

    securities are always correctly priced

    it is easy to find a buyer or seller

    transactions are completed quickly

    no transaction costs

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Secondary markets bring us closer to the ideal of a perfectly efficient market**
    - provide information about security pricing
    - give buyers and sellers access to each other
    - make it easier to complete transactions
    - low transaction costs

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **The New York Stock Exchange (NYSE) and National Association of Securities Dealers Automated Quotation (NASDAQ) rank one and two in total volume and total capitalization**
  - **The NASDAQ is larger than the NYSE in terms of number of companies listed and shares traded daily**
  - **Most secondary market transactions in the U.S. occur on a stock exchange**

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Four types of secondary markets**

    direct search

    broker

    dealer

    auction

    - *These differ in the amount of information about prices available to investors, which influences each market's efficiency.*

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Direct Search**

    A buyer and seller must find each other without assistance. A search among all possible partners to locate the best price is seldom done.

    Transactions are so infrequent that no third party (broker or dealer) has incentives to serve the market.

    Is the least efficient market - farthest from the ideal that provides complete price information.

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Direct Search**

    sale of small private company's common stock

    private placement of common stock

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Broker**

    Brokers earn a fee, a commission, for bringing buyers and sellers together.

    Dealing with buyers and sellers provides brokers with extensive information about prices at which investors are willing to trade shares.

    A commission that is less than the cost of direct search gives an investor the incentive to pay a broker for price information.

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Dealer**

    Market efficiency is improved if someone provides continuous bidding (selling or buying) for a security so no time is lost searching for a partner.

    Dealers provide this service by owning inventories of securities from which they buy and sell to earn profit.

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Dealer**

    A dealer has an advantage over a broker because a broker cannot guarantee prompt execution of an order. A dealer holds an inventory of securities and can provide the guarantee.

    A dealer market eliminates time-consuming searches for a fair deal through immediate sales or purchases using a dealer's inventory of securities.

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Dealer**

    NASDAQ is the best-known dealer market.

    Electronic communications network (ECN) systems provide price information which should increase marketability and competition, and improve NASDAQ's efficiency.

    Dealer markets are called over-the-counter (OTC) markets.

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Auction**

    In an auction market, buyers and sellers interact with each other in a group and bargain over price.

    The auctioneer, or specialist, is designated by the exchange to be a dealer for certain securities and fill orders by public customers.

The Market for Stocks

- SECONDARY MARKETS AND EFFICIENCY
  - **Auction**

    The NYSE is the best-known auction market.

    The NYSE is the most efficient equity market in the U.S.

    The auction for a security on the NYSE takes place at a specific post on the floor of the exchange.

The Market for Stocks

- STOCK MARKET LISTINGS
  - **The Wall Street Journal, The New York Times, and other major newspapers provide stock listings for the NYSE, NASDAQ, and relevant regional exchanges**
  - **Exhibit 9.1 shows NYSE stock listings in the Wall Street Journal**

NYSE Stock Listings from the Wall Street Journal

EXHIBIT 9.1 NYSE Stock Listings from the Wall Street Journal

(1) Company Name	(2) Symbol	(3) Open	(4) High	(5) Low	(6) Close	(7) Net Chg
Acme United	ACU	10.10	10.35	10.09	10.28	0.31
Adams Resources&Energy	AE	19.04	19.25	18.85	19.00	0.20
AdCare Health Systems	ADK	3.65	3.65	3.58	3.58	–0.06
AdCare Health Systems WT	ADK%	1.30	1.30	0.95	1.30	–0.05
Adeona Pharmaceuticals	AEN	0.76	0.76	0.74	0.75	...
Advanced Photonix	API	1.06	1.09	1.02	1.02	–0.04
AdvanSource Biomaterials	ASB	0.29	0.29	0.27	0.27	–0.00
ADVENTRX Pharmaceuticals	ANX	2.07	2.09	2.07	2.07	–0.01
Aerocentury	ACY	15.78	16.05	15.55	16.05	–0.05
Aerosonic	AIM	2.80	2.85	2.76	2.85	...
Alexco Resource	AXU	6.10	6.10	5.78	5.84	–0.20
Allied Nevada Gold	ANV	25.28	25.54	24.81	25.40	–0.12
Almaden Minerals	AAU	2.76	2.77	2.65	2.73	–0.03

Source: Wall Street Journal Online, Monday, October 18, 2010

NYSE Stock Listings from the Wall Street Journal

(8) %Chg	(9) Vol	(10) 52 Week High	(11) 52 Week Low	(12) Div	(13) Yield	(14) PE	(15) YTD %Chg
3.11	2,157	13.04	8.11	0.24	2.33	10.49	11.75
1.06	1,990	25.18	15.25	0.50	2.63	26.76	–13.83
–1.76	16,872	6.10	2.10	...	...	...	–9.02
–3.70	10,168	3.32	0.11	...	...	...	–50.00
0.15	48,887	2.70	0.41	...	...	... dd	33.04
–3.76	11,032	1.19	0.41	...	...	... dd	47.83
–1.81	44,800	0.44	0.16	...	...	... dd	–5.32
–0.48	130,547	13.00	1.50	...	...	... dd	–76.34
–0.31	2,305	25.00	13.00	...	...	4.64	1.90
...	2,600	6.13	2.50	...	...	4.45	–35.81
–3.25	529,841	6.83	2.28	...	...	... dd	55.32
–0.47	546,846	28.19	9.19	...	...	40.97	68.44
–1.09	241,558	3.29	0.67	...	...	... dd	160.00

The Market for Stocks

- STOCK MARKET INDEXES
  - **A stock market index is a select group of stocks whose performance is used to estimate the performance of a larger group of stocks**
    - Dow Jones Industrial Average
    - NASDAQ Composite Index
    - New York Stock Exchange Index
    - Standard & Poor's 500 Index

Equity Securities

- COMMON STOCK AND PREFERRED STOCK
  - **Represent ownership interest in a corporation**
  - **Are the two most frequently used types of equity securities**
  - **Dividend payments do not affect a firm's taxes**

Equity Securities

- COMMON STOCK AND PREFERRED STOCK
  - **Are not "guaranteed" dividends, but dividends are "promised" to preferred stockholders**
  - **Have limited liability so claims made against the corporation cannot include a stockholder's personal assets**
  - **Are generally viewed as perpetuities because they do not have maturity dates**

Equity Securities

- COMMON STOCK
  - **Is the basic ownership claim in a corporation**
  - **Has the right to vote on matters such as electing a board of directors, setting a capital budget, and proposed mergers or acquisitions**
  - **Has the right to a firm's residual assets after creditors, preferred stockholders, and others with higher priority claims have been satisfied**

Equity Securities

- PREFERRED STOCK:
  - Represents ownership in corporation
  - Does not have the right to vote
  - Has priority over common stock with respect to dividends and liquidation of assets
  - Must be paid a fixed dividend before funds are distributed to common stockholders

Equity Securities

- PREFERRED STOCK: DEBT OR EQUITY?
  - **Preferred stock is equity but a strong case can be made that it is a special type of debt**

    Regular preferred has no voting rights.

    Dividends are due regardless of earnings.

    It frequently has a credit rating.

    It may be convertible into common stock.

    Most preferred is not a “true perpetuity” – it may be called/retired by a firm.

Equity Securities

- VALUATION OF EQUITY SECURITIES
  - **The value of common and preferred stock is estimated using the methodology employed for bond valuation in Chapter 6**

Equity Valuation

- VALUATION OF EQUITY SECURITIES
  - **Valuing common stock is more difficult than valuing bonds or preferred stock because**
    1. Size and timing of dividends are less certain compared to coupon payments.
    2. The rate of return on common stock cannot be observed directly from the market.
    3. Common stock is a true perpetuity because it has no maturity date.

Equity Valuation

- ONE-PERIOD MODEL FOR MARKET VALUE
  - **The market value of a share of stock today equals the combined present value of two future cash inflows – the expected end-of-period dividend and the expected end-of-period stock price**

$$P_0 = \frac{D_1 + P_1}{(1+R)^1}$$

Equity Valuation

- TWO-PERIOD MODEL FOR MARKET VALUE
  - **Can be viewed as a combination of two one-period models**

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2 + P_2}{(1+R)^2}$$

Equity Valuation

- PERPETUITY MODEL FOR MARKET VALUE
  - **Can be viewed as an infinite series of one-period stock pricing models**

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \ldots + \frac{D_\infty}{(1+R)^\infty}$$

Equity Valuation

- PERPETUITY MODEL FOR MARKET VALUE
  - **Though theoretically sound, it is not practical to add an infinite number of items**

Equity Valuation

- GENERAL DIVIDEND VALUATION MODEL
  - **Equation 9.1 is a general model for valuing a share of stock**

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \ldots + \frac{D_t}{(1+R)^t} = \sum_{t=1}^{\infty} \frac{D_n}{(1+R)^t} \qquad (9.1)$$

Equity Valuation

- GENERAL DIVIDEND VALUATION MODEL
  - **The value of a share of stock is the present value of all expected future cash dividends**
  - **Model does not include specific assumptions, such as a constant growth rate, for estimating expected future cash dividends**

Equity Valuation

- GENERAL DIVIDEND VALUATION MODEL
  - Requires dividend forecasts for an infinite number of periods
  - Does not include specific assumptions about how to forecast dividends or when a share of stock might be sold
  - Implies the intrinsic value of a share of stock is determined by the market's expectations of a firm's future cash-flows

Equity Valuation

- GROWTH STOCK PRICING PARADOX
  - **Growth stock**

    Stock of a company whose earnings are growing at an above-average rate and are expected to continue to do so for some time.

Equity Valuation

- GROWTH STOCK PRICING PARADOX
  - **Rapidly-growing firms typically pay no dividends on common stock during the growth phase**
  - **Rapidly-growing firms have many high-return investment opportunities; investors are better off if firms reinvest earnings**
  - **Equation 9.1 predicts – and common sense says – the shares of a company that will never pay cash to investors are worthless**

Equity Valuation

- GROWTH STOCK PRICING PARADOX
  - **In reality, high-growth firms will eventually pay dividends**
  - **If investments made with reinvested funds succeed, a firm's net cash inflows should increase significantly**
    - Investors can sell their stock at much higher price than what they paid.

Equity Valuation

- SIMPLIFYING ASSUMPTIONS
  - **To make Equation 9.1 more applicable, some simplifying assumptions about the pattern of dividends are necessary**

Equity Valuation

- SIMPLIFYING ASSUMPTIONS
  - **Three models/assumptions for describing growth patterns of dividends**
    1. The dividend has a zero growth rate and is always the same.
    2. The dividend has a constant growth rate.
    3. The dividend has a mixed growth rate; i.e., the rate is higher in some periods and lower in others.

Equity Valuation

- ZERO-GROWTH DIVIDEND MODEL
  - **The dividend is constant**

    $D_1 = D_2 = D_3 = \ldots = D_\infty$
  - **Equation 9.1, the dividend-discount model, becomes**

$$P_0 = \frac{D}{(1+R)^1} + \frac{D}{(1+R)^2} + \frac{D}{(1+R)^3} + \ldots + \frac{D}{(1+R)^\infty}$$

Equity Valuation

- ZERO-GROWTH DIVIDEND MODEL
  - **This cash-flow pattern describes a perpetuity with a constant cash flow**
  - **Chapter 6 has a model for the present value of a perpetuity with a constant cash flow as CF/*i*, where CF is the constant cash-flow and *i* is the interest rate**
  - **Equation 9.2 is the valuation model for a zero-growth dividend stock**

Equity Valuation

- ZERO-GROWTH DIVIDEND MODEL

$$P_0 = \frac{D}{R} \qquad (9.2)$$

Equity Valuation

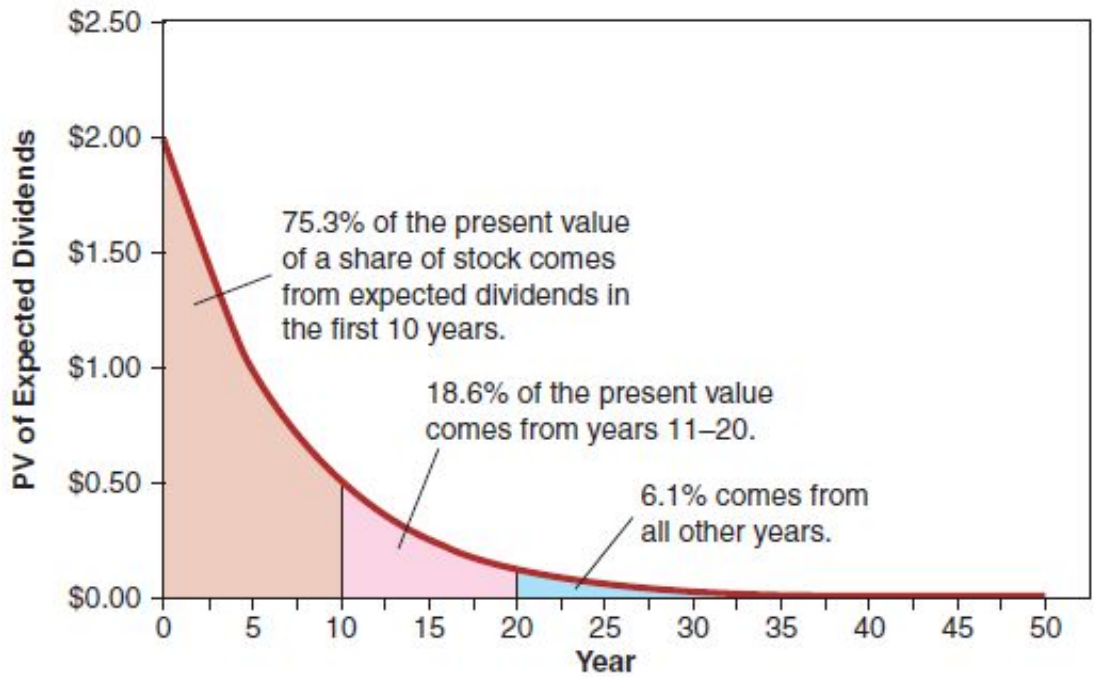
- ZERO-GROWTH DIVIDEND MODEL EXAMPLE
  - **Del Mar Corporation pays $5 dividend per year, and the board of directors has no plans to change the dividend. The firm's investors require a 20% return on investment. What should be the market price of the firm's stock?**

$$P_0 = \frac{D}{R} = \frac{\$5}{0.20} = \$25$$

Equity Valuation

- ZERO-GROWTH DIVIDEND MODEL
  - **Exhibit 9.2 shows that distant dividends have small present values and little influence on the current market price of a stock**

Impact on Stock Prices of Near and Distant Dividends



Note: Calculations based on discount rate of 15% and constant dividends.

EXHIBIT 9.2
Impact on Stock Prices of Near and Distant Future Dividends

Dividends expected far in the future have a smaller present value than dividends expected in the next few years, and so they have less effect on the price of the stock. As you can see in the exhibit, with constant dividends more than 75 percent of the current price of a share of stock comes from expected dividends in the first 10 years.

Equity Valuation

- CONSTANT-GROWTH DIVIDEND MODEL
  - **Cash dividends increase at the rate *g* from one period to the next forever**
  - **Constant dividend growth is a reasonable assumption for mature companies with a history of stable growth**

Equity Valuation

- CONSTANT-GROWTH DIVIDEND MODEL
  - **Deriving the constant-growth dividend model is fairly straightforward because it is based on Equation 6.6 from Chapter 6**

$$PVA_0 = CF/(i - g) \quad (6.6)$$

Equity Valuation

- CONSTANT-GROWTH DIVIDEND MODEL
  - **The current price of a share of stock is next period's dividend divided by the difference between the discount rate and the dividend growth rate**

Equity Valuation

- CONSTANT-GROWTH DIVIDEND MODEL
  - **The dividend at any time in the future**

$$D_t = D_0 \times (1+g)^t \qquad (9.3)$$

Equity Valuation

- CONSTANT-GROWTH DIVIDEND MODEL
  - **The current price of a share of stock**

$$P_0 = \frac{D_1}{R - g} \qquad (9.4)$$

Equity Valuation

- CONSTANT-GROWTH DIVIDEND EXAMPLE
  - **Big Red Automotive paid a dividend of $4.81 this year. The dividend is expected to increase by 4% annually and investors who own stock in similar firms require a return of 18%. What is the market value of the firm's stock?**

$$D_1 = D_0 \times (1+g)^1 = \$4.81 \times (1+.04)^1 = \$4.81 \times (1.04)^1 = \$5.00$$

$$P_0 = \frac{D_1}{R-g} = \frac{\$5.00}{.18-.04} = \frac{\$5.00}{.14} = \$35.71$$

Equity Valuation

- CONSTANT-GROWTH DIVIDEND MODEL
  - **The constant-growth dividend model (Equation 9.4) can be generalized to value a share of stock at any point in time**

    The value of a share of stock at any time

$$P_t = \frac{D_{t+1}}{R - g} \qquad (9.5)$$

Equity Valuation

- CONSTANT-GROWTH DIVIDEND EXAMPLE
  - **Ace, Inc. paid a dividend (D_0) of $2.50 today. Similar stocks yield 15%, and g is 5%. Estimate the stock price five years from today (P_5)**

$$D_6 = D_0 \times (1+g)^6 = \$2.50 \times (1+.05)^6 = \$2.50 \times (1.34) = \$3.35$$

$$P_0 = \frac{D_6}{R-g} = \frac{\$3.35}{.15-.05} = \frac{\$3.35}{.10} = \$33.50$$

Equity Valuation

- RELATIONSHIP BETWEEN R AND *g*
  - **The constant-growth dividend model yields invalid solutions when the dividend growth rate equals or exceeds the discount rate ($g \geq$ R)**

    If g = R, the denominator is zero and the value of the stock is infinite – which cannot occur.

    If g > R, the denominator of the fraction is negative and the stock price is negative – which cannot occur.

Equity Valuation

- SUPERNORMAL-GROWTH DIVIDEND MODEL
  - **Some firms experience a supernormal rate of growth in dividends early in their lives**
  - **Assuming the supernormal growth occurs first and is followed by the constant growth forever, Equations 9.1 and 9.5 can be used to value the stock of a firm with supernormal dividend growth**

Dividend Growth Rate Patterns

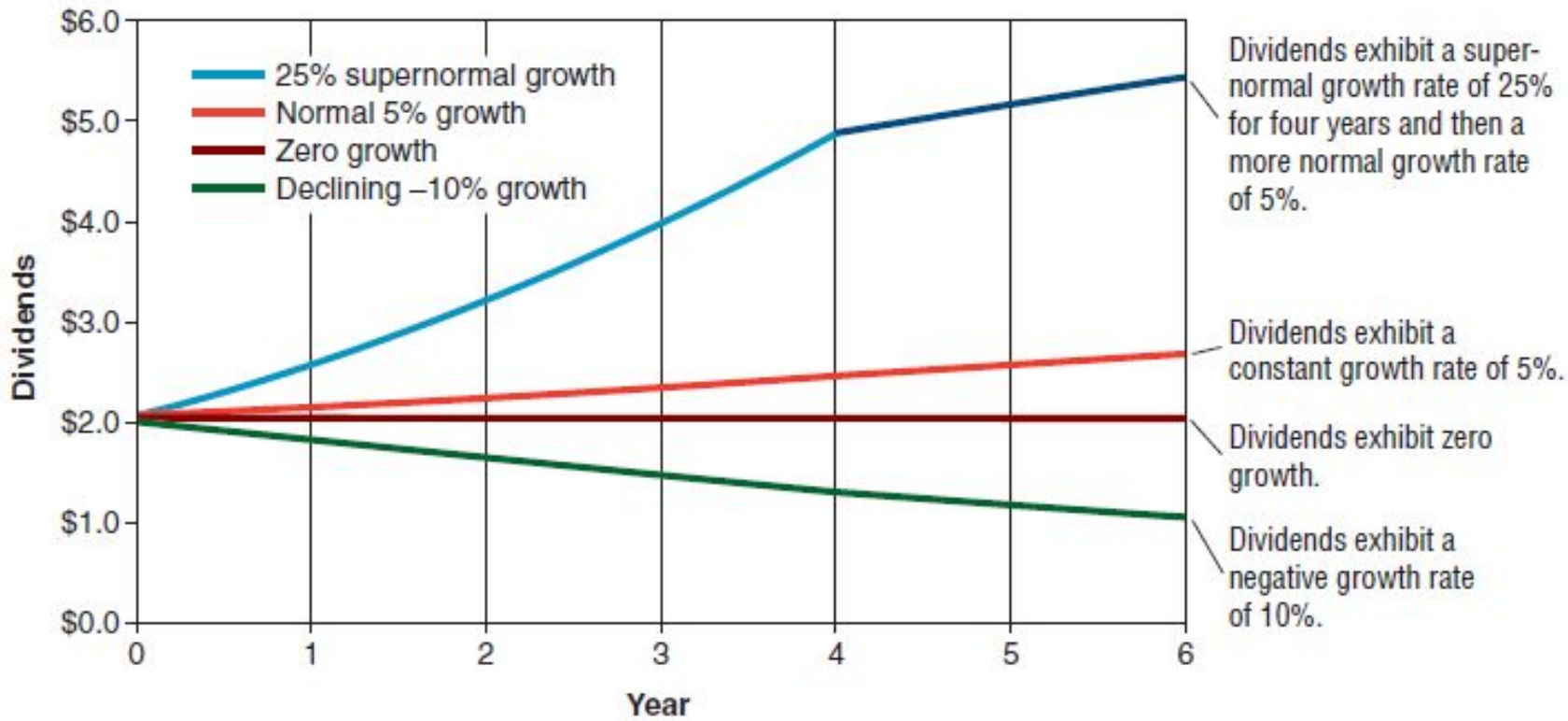


EXHIBIT 9.3
Dividend Growth Rate Patterns

Time Line for Nonconstant Dividend Growth Pattern

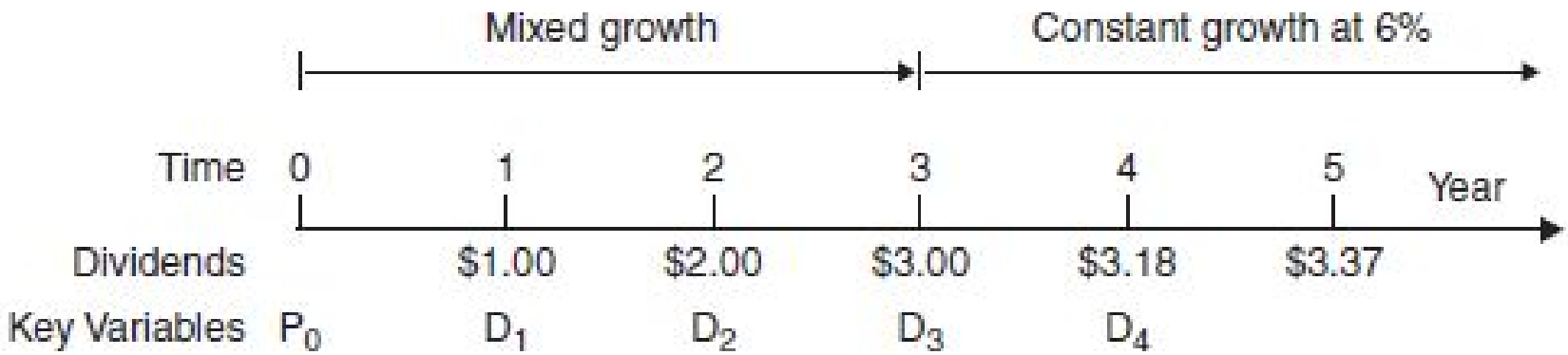


EXHIBIT 9.4

Time Line for Nonconstant Dividend Growth Pattern

The exhibit shows a time line for a nonconstant dividend growth pattern. The time line makes it easy to see that we have two different dividend growth patterns. For three years, the dividends are expected to grow at a mixed rate; after that, they are expected to grow at a constant rate of 6 percent.

Equity Valuation

- SUPERNORMAL-GROWTH DIVIDEND MODEL
  - **The valuation model**

    P_0 = PV (Non-constant dividend growth) + PV (Constant dividend growth)

Equity Valuation

- SUPERNORMAL-GROWTH DIVIDEND EXAMPLE

Value the stock described in Exhibit 9.4

$$D_4 = D_3 \times (1+g)^1 = \$3.00 \times (1.06)^1 = \$3.18$$

$$P_3 = \frac{D_4}{R-g} = \frac{\$3.18}{0.15-0.06} = \frac{\$3.18}{0.09} = \$35.33$$

$$P_0 = \frac{\$1.00}{(1.15)^1} + \frac{\$2.00}{(1.15)^2} + \frac{\$3.00}{(1.15)^3} + \frac{\$35.33}{(1.15)^3}$$

$$= \$0.87 + \$1.51 + \$1.97 + \$23.23$$

$$= \$27.58$$

Equity Valuation

- VALUING PREFERRED STOCK
  - To value preferred stock, one must know if it has an "effective maturity" because of a sinking fund or call option
  - The most significant difference between preferred stock and a bond is the stock has greater risk of not receiving promised payments

Equity Valuation

- VALUING PREFERRED STOCK
  - **Preferred stock dividends are payments to owners of the firm and failure to pay does not constitute default on a obligation**
  - **Failure to pay a preferred-stock dividend as promised has significant financial consequences because it signals the market that firm has serious financial problems**

Equity Valuation

- VALUING PREFERRED STOCK
  - **Preferred stock with a fixed maturity is priced using the bond valuation model developed in Chapter 8**
  - **Equation 8.2 can be restated as the price of a share of preferred stock (PS_0)**

Equity Valuation

- VALUING PREFERRED STOCK
  - **Price preferred stock with a fixed maturity with the bond valuation model, Equation 8.2, developed in Chapter 8**
  - **PS_0 = PV (Dividend payments) + PV (Par value)**
  - **Most preferred stocks make quarterly dividend payments so "m" equals 4**

$$PS_0 = \frac{D/m}{(1+i/m)^1} + \frac{D/m}{(1+i/m)^2} + \frac{D/m}{(1+i/m)^3} + \ldots + \frac{D/m + P_{mn}}{(1+i/m)^{mn}} \qquad (9.7)$$

Equity Valuation

- PREFERRED STOCK FIXED MATURITY EXAMPLE
  - **E-Corp preferred has a par value of $100, a dividend of $10 ($2.50 quarterly), and an effective maturity of 20 years. If similar stocks yield 8%, what is the value of the stock?**

$$PS_0 = \frac{\$10/2}{(1+0.08/2)^1} + \frac{\$10/2}{(1+0.08/2)^2} + \ldots + \frac{\$10/2+\$100}{(1+0.08/2)^{mn}}$$

$$= \frac{\$2.50}{(1+0.02)^1} + \frac{\$2.50}{(1+0.02)^2} + \ldots + \frac{\$2.50+\$100}{(1+0.02)^{80}}$$

$$= \$119.87$$

Equity Valuation

- PREFERRED STOCK FIXED MATURITY EXAMPLE
  - Calculator solution

Enter	80	2		2.50	100
	N	i	PV	PMT	FV
Answer			-119.87		

Equity Valuation

- VALUING PERPETUAL PREFERRED STOCK
  - Perpetual preferred stock has no maturity date
  - Dividends are fixed ($g = 0$)
  - Dividend payments go on forever
  - Use Equation 9.2 to value perpetual preferred stock

$$P_0 = \frac{D}{R} \qquad (9.2)$$

Equity Valuation

- PERPETUAL PREFERRED STOCK EXAMPLE
  - **Northwest Airlines has perpetual preferred stock that pays a dividend of $5 per year. Investors require an 18 percent return on similar investments. What is the value of Northwest's preferred?**

$$PS_0 = \frac{D}{R} = \frac{\$5}{0.18} = \$27.78$$