TOPIC 6: STOCKS, STOCK MARKETS, AND MARKET EFFICIENCY*

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For individuals, stocks are a key instrument for holding wealth; for companies, they are one of several ways to obtain financing. Beyond that, stocks and stock markets are one of the central links between the financial world and the real economy. This lecture studies the stock market and what fluctuations in stock value mean for individuals and for the economy as a whole. We also look at a critical connection between the financial system and the real economy.

1 THE ESSENTIAL CHARACTERISTICS OF COMMON STOCK

Stocks, also known as **common stock** or **equity**, are shares in a firm's ownership. A firm that issues stock sells part of itself so that the buyer becomes a part owner. Stocks have three characteristics:

- Shares are issued in small denominations, which allows investors to buy as little or as much of the company as they want.
- Shares are transferable, meaning an owner can sell them to someone else.
- Stockholders are **residual claimant**—they receive what is left from the company after all other creditors are paid what they are owed—and have **limited liability**—the maximum amount they can lose is their initial investment if the company goes bankrupt.

2 MEASURING THE LEVEL OF THE STOCK MARKET

Changes in stock values affect our consumption and saving patterns, causing general economic activity to fluctuate. We will look at four **stock-market indexes** that measure the level of fluctuation in the U.S. stock values:

- **Dow Jones Industrial Average (DJIA)** measures the value of purchasing a single share of the stocks from each of the 30 largest U.S. companies. It is a **price-weighted average** index so the behavior of higher-priced stocks dominates its movement.

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Disclaimer: these are notes that I used by myself to lecture from and for educational purposes only. The material presented here is largely based upon the undergraduate textbook by Stephen Cecchetti and Kermit Schoenholtz (2014), *Money, Banking and Financial Markets*, 4th Edition, McGraw-Hill/Irwin. Please do NOT circulate.

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- **Standard & Poor's 500 Index** tracks the total value of owning the entirety of the 500 largest U.S. firms. It is a **value-weighted average** index so the behavior of stocks with higher market values dominates its movement.
- **Nasdaq Composite Index** is a value-weighted index of nearly 3000 U.S. securities traded on the over-the-counter (OTC) market through the Nasdaq service.
- **Wilshire 5000** is a value-weighted index of all publicly traded U.S. stocks with available prices.

3 VALUING STOCKS

Some investors estimate stock values based on a detailed study of companies' financial statements. In their view, the value of a firm's stock depends on its **fundamentals**—current assets and estimates of future profitability.

Fundamental value and the dividend-discount model. We first ignore risk. Suppose an investor plans to buy a stock today and sell it in one year. Let P_t be the purchase price, P_{t+1} the sale price one year later, and D_{t+1} the dividend payment next year.

- The stock price today can be written as

$$P_t = \frac{D_{t+1}}{1+i} + \frac{P_{t+1}}{1+i} \tag{3.1}$$

where i is the interest rate used to compute the present value. Similarly, the stock price next year is given by

$$P_{t+1} = \frac{D_{t+2}}{1+i} + \frac{P_{t+2}}{1+i} \tag{3.2}$$

Substituting (3.2) into (3.1) gives

$$P_t = \frac{D_{t+1}}{1+i} + \frac{D_{t+2}}{(1+i)^2} + \frac{P_{t+2}}{(1+i)^2} \tag{3.3}$$

Repeating this process gives

$$P_t = \frac{D_{t+1}}{1+i} + \frac{D_{t+2}}{(1+i)^2} + \cdots + \frac{D_{t+n}}{(1+i)^n} + \frac{P_{t+n}}{(1+i)^n} \tag{3.4}$$

which suggests that the stock price today is the present value of the sum of the dividends plus the present value of the sale price n years from now.

- Further suppose that dividends grow at a constant rate of g per year. Thus, the dividend n years from now is given by

$$D_{t+n} = D_t(1+g)^n \tag{3.5}$$

Substituting (3.5) into (3.4) gives

$$\begin{aligned} P_t &= \sum_{k=1}^{n} \frac{D_t(1+g)^k}{(1+i)^k} + \frac{P_{t+n}}{(1+i)^n} \\ &= \lim_{n\to\infty} \sum_{k=1}^{n} \frac{D_t(1+g)^k}{(1+i)^k} \quad \text{(imagine firm pays dividends forever)} \\ &= \frac{D_t(1+g)}{i-g} \quad (i > g) \end{aligned} \tag{3.6}$$

which is called the **dividend-discount model**. It tells us that stock prices should be high when dividends (D_t) are high, or when dividend growth (g) is rapid, or when interest rate (i) is low.

Why stocks are risky. Recall that **leverage** is the practice of borrowing to finance part of an investment, and it creates risk. For example, suppose a software company needs a computer that costs $\$1,000$ and the purchase can be financed by any combination of stock and bonds (10% interest rate). Assume that the company earns \$160 in good years and \$80 in bad years with equal probability. Then the more debt, the more leverage, and the greater the stockholders' risk because they are residual claimants. See Table 8.3 below.

Table 8.3 Returns Distributed to Debt and Equity Holders under Different Financing Assumptions

Percent Equity (%)	Percent Debt (%)	Required Payments on 10% Bonds ($)	Payment to Equity Holders ($)	Equity Return (%)	Expected Equity Return (%)	Standard Deviation of Equity Return
100%	0	0	\$80–\$160	8–16%	12%	4%
50%	50%	\$50	\$30–\$110	6–22%	14%	8%
30%	70%	\$70	\$10–\$90	$3\frac{1}{3}$–30%	$16\frac{2}{3}$%	$13\frac{1}{3}$%
20%	80%	\$80	\$0–\$80	0–40%	20%	20%

Risk and the value of stocks. Stockholders require compensation for bearing risk; the higher the risk, the greater the compensation. This means we can think of the required stock return (i) as the sum of risk-free interest rate (rf) and equity risk premium (rp). Then the dividend-

discount model (3.6) is given by

$$P_t = \frac{D_t(1+g)}{rf + rp - g} \quad (i > g) \tag{3.7}$$

which suggests that stock prices are high when: [i.] current dividend is high; [ii.] dividends are expected to grow quickly; [iii.] risk-free rate is low; [iv.] equity risk premium is low.

The theory of efficient markets. The reasoning that prices of all financial instruments reflect all available information is commonly called the**theory of efficient markets**. As a result, markets adjust immediately and continuously to changes in fundamental values. Think about why this theory implies that stock price movements are unpredictable and no one can consistently beat the market average.

4 Investing in Stocks for the Long Run

Assigned as reading.

5 The Stock Market's Role in the Economy

Assigned as reading. You should know what are **bubbles**—persistent and expanding gaps between actual stock prices and those warranted by the fundamentals—and how they distort the economic decisions companies and consumers make.