

**CHAPTER 5: THE STOCK MARKET,
THE THEORY OF RATIONAL
EXPECTATIONS,
AND THE EFFICIENT MARKET
HYPOTHESIS**

FINANCIAL MARKETS

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OUTLINE

- Computing the Price of Common Stock
- How the Market Sets Stock Prices
- The Theory of Rational Expectations
- The Efficient Market Hypothesis: Rational Expectations in Financial Markets

INTRODUCTION

- We have witnessed huge swings in the stock market in recent years. (boom in 2002 and crisis in 2008-9)
- Because so many people invest in the stock market and the price of stocks affects the ability of people to retire comfortably, the market for stocks is undoubtedly the financial market that receives the most attention
- In this chapter we discuss the fundamental theories that underlie the valuation of stocks

COMPUTING THE PRICE OF COMMON STOCK

The One-Period Valuation Model:

$$P_0 = \frac{Div_1}{(1+k_e)} + \frac{P_1}{(1+k_e)}$$

P_0 = the current price of the stock

Div_1 = the dividend paid at the end of year 1

k_e = the required return on investment in equity

P_1 = the sale price of the stock at the end of the first period

COMPUTING THE PRICE OF COMMON STOCK

The Generalized Dividend Valuation Model:

The value of stock today is the present value of all future cash flows

$$P_0 = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \dots + \frac{D_n}{(1+k_e)^n} + \frac{P_n}{(1+k_e)^n}$$

If P_n is far in the future, it will not affect P_0

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_e)^t}$$

The price of the stock is determined only by the present value of the future dividend stream

COMPUTING THE PRICE OF COMMON STOCK

The Gordon Growth Model:

$$P_0 = \frac{D_0(1+g)}{(k_e - g)} = \frac{D_1}{(k_e - g)}$$

D_0 = the most recent dividend paid

g = the expected constant growth rate in dividends

k_e = the required return on an investment in equity

Dividends are assumed to continue growing at a constant rate forever

The growth rate is assumed to be less than the required return on equity

AN EXAMPLE

- Let's compute the *current market price of Coca-Cola stock*, assuming:
 - dividends grow at a constant rate of 10.95%
 - $D_0 = \$1.00$
 - and the required return is 13%.

- **Solution:**

$$P_0 = \frac{D_0 \times (1 + g)}{k_e - g}$$

$$P_0 = \frac{\$1.00 \times (1.1095)}{0.13 - 0.1095}$$

$$P_0 = \frac{\$1.1095}{0.0205} = \$54.12$$

- Coca-Cola stock should sell for **\$54.12** if the assumptions regarding the constant growth rate and required return are correct.

IMPLICATION OF THE GORDON GROWTH MODEL

- Questions:

- 1) What does the model predict regarding the stock market prices in an economy facing a crisis?
- 2) What will be the impact of lowering the interest rate (monetary policy) on stock prices?

APPLICATION: THE GLOBAL FINANCIAL CRISIS AND THE STOCK MARKET



- The financial crisis that started in August 2007 led to one of the worst bear markets in 50 years.
- Downward revision of growth prospects: $\downarrow g$
- Increased uncertainty: $\uparrow k_e$
- Gordon model predicts a drop in stock prices.

- Theoretically, the best method of stock valuation is the dividend valuation approach.
- Sometimes, however, it is difficult to apply:
 - If a firm is not paying dividends
 - firm having a very volatile growth rate

HOW THE MARKET SETS STOCK PRICES

- The price is set by the buyer willing to pay the highest price.
- The market price will be set by the buyer who can take best advantage of the asset.
- Superior information about an asset can increase its value by reducing its perceived risk.

HOW THE MARKET SETS STOCK PRICES

- Information is important for individuals to value each asset.
- When new information is released about a firm, expectations and prices change.
- Market participants constantly receive information and revise their expectations, so stock prices change frequently.

THE THEORY OF RATIONAL EXPECTATIONS

- Adaptive expectations:
 - Expectations are formed from past experience only.
 - Changes in expectations will occur slowly over time as data changes.
 - **However, people use more than just past data to form their expectations and sometimes change their expectations quickly.**

THE THEORY OF RATIONAL EXPECTATIONS

- **John Muth** : “*The Theory of Rational Expectations*”
 - Expectations will be identical to optimal forecasts using all available information.
 - Even though a rational expectation equals the optimal forecast using all available information, a prediction based on it may not always be perfectly accurate.
 - It takes too much effort to make their expectation the best guess possible.
 - The best guess will not be accurate because the predictor is unaware of some relevant information.



FORMAL STATEMENT OF THE THEORY

$$X^e = X^{of}$$

X^e = expectation of the variable that is being forecast

X^{of} = optimal forecast using all available information

RATIONALE BEHIND THE THEORY

- The incentives for equating expectations with optimal forecasts are especially strong in financial markets. In these markets, people with better forecasts of the future get rich.
- The application of the theory of rational expectations to financial markets (where it is called the efficient market hypothesis or the theory of efficient capital markets) is thus particularly useful.

IMPLICATIONS OF THE THEORY

- If there is a change in the way a variable moves, the way in which expectations of the variable are formed will change as well.
 - Changes in the conduct of monetary policy (e.g. target the federal funds rate)
- The forecast errors of expectations will, on average, be zero and cannot be predicted ahead of time.

THE EFFICIENT MARKET HYPOTHESIS: RATIONAL EXPECTATIONS IN FINANCIAL MARKETS

Recall

The rate of return from holding a security equals the sum of the capital gain on the security, plus any cash payments divided by the initial purchase price of the security.

$$R = \frac{P_{t+1} - P_t + C}{P_t}$$

R = the rate of return on the security

P_{t+1} = price of the security at time $t + 1$, the end of the holding period

P_t = price of the security at time t , the beginning of the holding period

C = cash payment (coupon or dividend) made during the holding period

THE EFFICIENT MARKET HYPOTHESIS: RATIONAL EXPECTATIONS IN FINANCIAL MARKETS

At the beginning of the period, we know P_t and C .

P_{t+1} is unknown and we must form an expectation of it.

The expected return then is

$$R^e = \frac{P_{t+1}^e - P_t + C}{P_t}$$

Expectations of future prices are equal to optimal forecasts using all currently available information so

$$P_{t+1}^e = P_{t+1}^{of} \Rightarrow R^e = R^{of}$$

Supply and Demand analysis states R^e will equal the equilibrium return R^* , so

$$R^{of} = R^*$$

THE EFFICIENT MARKET HYPOTHESIS: RATIONAL EXPECTATIONS IN FINANCIAL MARKETS

- Current prices in a financial market will be set so that the optimal forecast of a security's return using all available information equals the security's equilibrium return.
- In an efficient market, a security's price fully reflects all available information.

RATIONALE BEHIND THE HYPOTHESIS

$$R^{of} > R^* \Rightarrow P_t \uparrow \Rightarrow R^{of} \downarrow$$

$$R^{of} < R^* \Rightarrow P_t \downarrow \Rightarrow R^{of} \uparrow$$

until

$$R^{of} = R^*$$

In an efficient market, all unexploited profit opportunities will be eliminated

HOW VALUABLE ARE PUBLISHED REPORTS BY INVESTMENT ADVISORS?

- Information in newspapers and in the published reports of investment advisers is readily available to many market participants and is already reflected in market prices.
- Acting on this information will not yield abnormally high returns, on average.
- The empirical evidence for the most part confirms that recommendations from investment advisers cannot help us outperform the general market.

EFFICIENT MARKET PRESCRIPTION FOR THE INVESTOR

- Recommendations from investment advisors cannot help us outperform the market.
- A hot tip is probably information already contained in the price of the stock.
- Stock prices respond to announcements only when the information is new and unexpected.
- A “buy and hold” strategy is the most sensible strategy for the small investor.

WHY THE EFFICIENT MARKET HYPOTHESIS DOES NOT IMPLY THAT FINANCIAL MARKETS ARE EFFICIENT

- Some financial economists believe all prices are always correct and reflect **market fundamentals** (items that have a direct impact on future income streams of the securities) and so financial markets are efficient.
- However, prices in markets like the stock market are unpredictable- This casts serious doubt on the stronger view that financial markets are efficient.

BEHAVIORAL FINANCE

- The lack of short selling (causing over-priced stocks) may be explained by loss aversion.
- The large trading volume may be explained by investor overconfidence.
- Stock market bubbles may be explained by overconfidence and social contagion.

REFERENCES

- The Economics of Money, Banking and Financial Markets (8th edition, 2015) Frederic S. Mishkin (Chapter 7)