Monetary Theory and Policy

Chapter 7： The Stock Market, the Theory of Rational Expectations, and the Efficient Market Hypothesis

One-Period Valuation Model

- 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

Generalized Dividend Valuation Model

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

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

- 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

Gordon Growth Model

- 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

How the Market Sets 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 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.

Application: The Subprime Financial Crisis and the Stock Market

- 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.

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.

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 the expectation the best guess possible
  - Best guess will not be accurate because 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

Implications

- 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.

Efficient Markets: Application of Rational Expectations

- 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

Efficient Markets (cont'd)

- 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

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

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

$$P^e_{t+1} = P^{of}_{t+1} \Rightarrow R^e = R^{of}$$

- Supply and Demand analysis states R^e will equal the equilibrium return R*, so R^{of} = R*

Efficient 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

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

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

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

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

Application Investing in the Stock Market

- 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

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