

Lecture 5

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

Roadmap

This lecture aims to explore:

- ▶ **Method for stock valuation:**
understand forces that cause value of stock to \uparrow or \downarrow over time.
- ▶ **Theory of rational expectation:**
how expectation about market affect stock behavior.
- ▶ **Efficient market hypothesis:**
implication of how market in other securities beside stock operates.



I.

Method for stock valuation:

Computing the Price of Common Stock



Computing the Price of Common Stock

I. One-Period Valuation Model

- **Strategy: buy stock → hold 1 period to get dividend → sell**
- **Principle: Value of Investment = PV of Future Cash Flows**

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

Future cash flow

- **P_0 = current stock price**
 - **Discount factor is k_e = required return on investment in equity**
 - **Div_1 = dividend paid at the end of year 1**
 - **P_1 = predicted sale price of stock at the end of year 1**
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Example of one-period valuation model

- You have extra money for 1 year but need to pay tuition next year
- Stock A sells for \$50 per share and pay dividend \$0.16 per year
- Analyst predict that stock A will be selling for \$60 in 1 year.
- You decide that you would require the return on investment in stock A of 12%

-Should you buy this stock? *To value stock today, you need to find present value of expected cash flow*

$$P_0 = \frac{0.16}{1+0.12} + \frac{60}{1+0.12} = \$53.71$$

Hence PV of all cash flows from the stock is \$53.71

Whereas the current price per share is \$50

→ You decide to buy the stock



II. Generalized Dividend Valuation Model

Value of stock today = PV of all future cash flow (dividends + final sale price at time n)

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

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

For example: stock sell for \$50 in 75 years from now with 12% discount rate $\rightarrow PV = 50 / (1+0.12)^{75} = \0.01

- ▶ Since last term of the equation is small, eq. 2 can be written as

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+k_e)^t} \quad (3)$$

- ▶ This implied that current value of a price of stock can be calculated as PV of future dividend stream

III. Gordon Growth Model

- ▶ Assuming dividend growth is constant, Equation 3 can be written as

$$P_0 = \frac{D_0 \times (1+g)^1}{(1+k_e)^1} + \frac{D_0 \times (1+g)^2}{(1+k_e)^2} + \dots + \frac{D_0 \times (1+g)^\infty}{(1+k_e)^\infty} \quad (4)$$

- ▶ Assuming the growth rate is less than the required return on equity, Equation 4 can be written as

$$P_0 = \frac{D_0 \times (1+g)}{(k_e - g)} = \frac{D_1}{(k_e - g)} \quad (5)$$

- ▶ g = expected constant growth rate of dividend
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How the markets set stock price?

Investor	Discount rate	Stock price
You	15%	\$16.67
Jennifer	12%	\$22.22
Bud	10%	\$28.57



Applications

- ▶ Monetary Policy and stock price
- ▶ Global financial crisis and stock price



II.

**Theory of Rational Expectations
&
Efficient Markets Hypothesis**



Theory of Rational Expectations

- Rational expectation theory (RE) tell us how expectation are formed.
- People use more information than just past data to form their expectation
- People expectation of inflation will be affected by their prediction of future monetary policy as well as current and past monetary policy
- People often change their expectation quickly in light of new information
- RE is identical to optimal forecast (best prediction of future) using all available information: i.e.,

$$\text{RE} \Rightarrow X^e = X^{of}$$

2 reasons expectation may not be rational

1. Not best prediction (no effort)
2. Not using available information (no awareness of new info.)

Rational expectation, although optimal prediction, may not be accurate

Implications:

1. Change in way variable moves, way expectations are formed changes
 - 2▶ Forecast errors on average = 0 and are not predictable
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Efficient Markets Hypothesis

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

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

Rational Expectations implies:

$$P_{t+1}^e = P_{t+1}^{of} \Rightarrow RET^e = RET^{of} \quad (1)$$

Market equilibrium

$$RET^e = RET^* \quad (2)$$

Put (1) and (2) together: Efficient Markets Hypothesis

$$RET^{of} = RET^*$$

Why the Efficient Markets Hypothesis makes sense

If $RET^{of} > RET^* \Rightarrow P_t \uparrow, RET^{of} \downarrow$

If $RET^{of} < RET^* \Rightarrow P_t \downarrow, RET^{of} \uparrow$

until $RET^{of} = RET^*$

1. All unexploited profit opportunities eliminated
2. Efficient Market holds even if are uninformed, irrational participants in market (theory does not require everybody to be well informed)

In an efficient market, security price fully reflects all available information

Evidence on Efficient Markets Hypothesis

Favorable Evidence

1. Investment analysts and mutual funds don't beat the market
2. Stock prices reflect publicly available information: anticipated announcements don't affect stock price (market only respond to new and unexpected announcement)
3. In an efficient market, all unexploited profit opportunities are eliminated

Unfavorable Evidence

1. Stock market crash (market overreaction, excessive volatility, factor other than fundamental affects stock price such as psychological factor, institutional structure of market place)
2. Stock market bubble (unexploited profit opportunities may exist)



Implications for Investing

1. Published reports of financial analysts not very valuable
2. Should be skeptical of hot tips
3. Stock prices may fall on good news
4. Prescription for investor
 1. Shouldn't try to outguess market
 2. Therefore, buy and hold
 3. Diversify with no-load mutual fund

