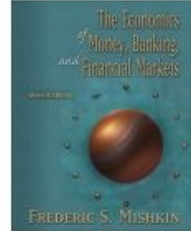


ECON 354 Money and Banking

Professor Yamin Ahmad

Lecture 14

- Stock Market
- Rational Expectations
- Efficient Markets Hypothesis



Big Concepts

- How are Stocks Priced?
 - Gordon Growth Model
- How to incorporate people's expectations about the market...
- ... Market Efficiency and the Efficient Markets Hypothesis

Note: These lecture notes are incomplete without having attended lectures

Computing the Price of Common Stock

- Basic Principle of Finance
 - Value of Investment = Present Value of Future Cash Flows
- One-Period Valuation Model

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

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Generalized Dividend Valuation Model

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

- Since we do not know in advance what the future price in period will be, we replace it with what we expect it to be, P^e :

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

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Generalized Dividend Valuation Model

- Equation 2 is made up of two parts:

- i. “Fundamentals”:

$$\sum_{t=1}^n \frac{D_t}{(1+k_e)^t} = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \dots + \frac{D_n}{(1+k_e)^n}$$

- ii. “Bubble”:
- $$\frac{P_n^e}{(1+k_e)^n}$$

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Question...

- Consider the tech stocks in the late 1990’s and the “dot-com” phenomena. They offered no dividends.
- Can the generalized dividend model of equation (2) reflect the price of those stocks?

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

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Generalized Dividend Model (cont.)

- If we let period “n” be very large, then equation (2) boils down to:

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

- In other words: the price of the stock should be the present discounted value of the stream of dividends it pays out.

- Note:

- The price of the stock is accurately reflected in terms of its fundamentals.
- The presence of a bubble distorts the relationship above

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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

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

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Expectations...

- Key Question: How are Expectations Formed?
- Types of Expectations
 - Adaptive Expectations
 - Rational Expectations
 - Other types of expectations...
- Here we focus on Rational Expectations

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Theory of Rational Expectations

- **Rational Expectations** (Muth): People use available information efficiently, including how the economy works.
- In practice this boils down to assuming agents use the same model of the economy as the researcher (“model-consistent” expectations).
- People can make mistakes, but they do not make systematic forecasting errors.

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Theory of Rational Expectations

Definition:

Rational expectation (RE) = Expectation that is optimal forecast (best prediction of future) using all available information:

i.e., RE

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$$X^e = X^{of} = E_t[X | \Omega_t]$$

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Rational Expectations (cont...)

- 2 reasons Expectations may not be rational
 - Not best prediction
 - Not using available information
- Rational expectation, although optimal prediction, may not be accurate
- Rational expectations makes sense because is costly not to have optimal forecast

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Implications:

1. If there is a change in the way a variable moves, then the way expectations are formed also changes
2. Forecast errors on average = 0 and are not predictable

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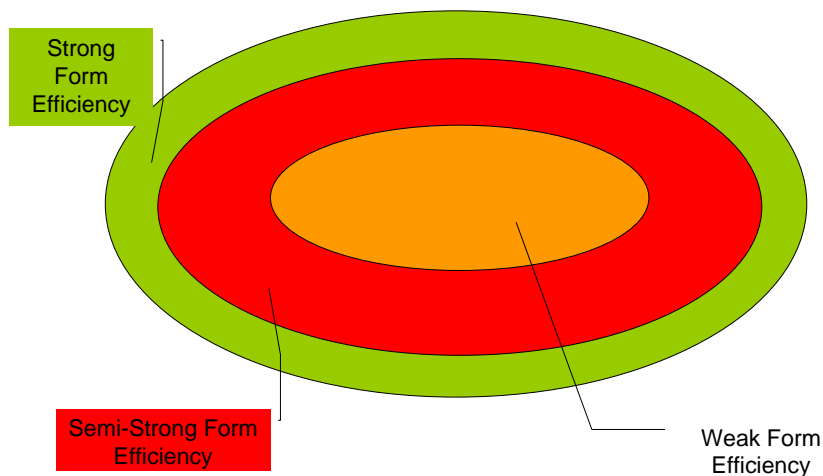
Types of Market Efficiency

- Define: **Market Efficiency** – how quickly do markets reflect *new* information?
- 3 Types of Market Efficiency:
 - Weak form efficient
 - Semi-strong form efficient
 - Strong form efficient

Note: These **do not** refer to the degree to which markets are efficient. They refer to the type of efficiency that exists in markets

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Market Efficiency



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Market Efficiency

- Recall: We are asking how quickly do markets respond to new information?
- Response to new information can cause:-
 - A delayed reaction
 - An efficient market reaction
 - An overreaction and correction

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Efficient Markets Hypothesis: An Example

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

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

Rational Expectations implies:

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

Market equilibrium

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

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Efficient Markets Hypothesis: An Example

Put (1) and (2) together:

Efficient Markets Hypothesis

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

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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 $RET^{of} = RET^*$

Note:

1. All unexploited profit opportunities eliminated
2. Efficient Market holds even if are uninformed, irrational participants in market

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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
3. Stock prices and exchange rates close to random walk
If predictions of ΔP big, $R^{of} > R^* \Rightarrow$ predictions of ΔP small
4. Technical analysis does not outperform market

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Evidence on Efficient Markets Hypothesis

Unfavorable Evidence

1. Small-firm effect: small firms have abnormally high returns
2. January effect: high returns in January
3. Market overreaction
4. Excessive volatility
5. Mean reversion
6. New information is not always immediately incorporated into stock prices

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Overview

Efficient Markets Hypothesis:

⇒

Reasonable starting point but not whole story

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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
 - Shouldn't try to outguess market
 - Therefore, buy and hold
 - Diversify with no-load mutual fund

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Evidence on Rational Expectations in Other Markets

1. Bond markets appear efficient
2. Evidence with survey data is mixed
 - Skepticism about quality of data
3. Following implication is supported: if there is a change in the way a variable moves, then the way expectations are formed also changes

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