The Stock Market

- Most talked about: **Up and down Economics!**
- Importance of stock market
  - Financing companies: channeling of resources
  - Value of companies: efficient allocation of resources
  - Households’ wealth accumulation
- Stock valuation
  - One-period dividend valuation model
  - Generalizing to multi period
  - The ‘Gordon’ version

The Common Stock (or equity)

- Raise funds: ownership of the company
- Share in profits (residual claimant)
  - Production inputs and creditors must be paid off first
- Voting rights
  - Managers and directors *versus* shareholder
- Limited liability
  - Losses cannot exceed the price paid
Determination of Current Value: Dividend Valuation Model

Basic principle of finance

\[
\text{value of investment} = \text{discounted present value of all future cash flows}
\]

- Cash flow from stocks
  - Dividend: periodic payment
  - Sale price: capital gain if price appreciates

- Present value

- Models
  - One-period model
  - Generalized \((n\text{-period})\) model
  - The Gordon growth model

Dividend Valuation Model: One-period Model

\[
P_0 = \frac{D_1}{(1 + k_e)} + \frac{P_1}{(1 + k_e)}
\]

- \(P_0\) = current value of the stock
- \(D_1\) = the dividend paid at the end of year 1
- \(k_e\) = discount factor / yield
- \(P_1\) = price at the end of the first period

Example: \(k_e = 0.12, D_1 = 0.16 \text{ [expected]}, P_1 = $60 \text{ [expected]} \)

Then, \(P_0 = $53.71\)
Dividend Valuation Model: Generalized n-period Model

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

\[ \equiv \frac{D_1}{(1+k_e)^n} + \frac{D_2}{(1+k_e)^n} + \ldots + \frac{D_n}{(1+k_e)^n} \]

If \( n \) is very large then \( P_n \) does not significantly affect \( P_0 \).

Example: \( k_e = 0.12, P_n = \$60, \ n = 50, \) then, \( \frac{P_n}{(1+k_e)^n} = 21 \) cents.

Hence, \( P_0 = \sum_{n=1}^{\infty} \frac{D_n}{(1+k_e)^n} \)

- The only thing that matters is the dividend
- Current value = PDV of future dividend stream

Dividend Valuation Model: Gordon Growth Model (continued)

- Information requirement of the generalized model very high
- Assume a Constant growth of dividend \((g)\).

Let, \( D_0 \) = most recent (say, current period) dividend paid
\( D_1 = D_0(1 + g) = \) estimate of dividend next period
\( D_2 = D_1(1 + g) = D_0(1 + g)^2 \)

- Need to have two things
  - Information about today’s dividend \((D_0)\)
  - Estimate of growth potential of the corporation
Dividend Valuation Model: Gordon Growth Model

\[ P_0 = \frac{D_1}{(1 + k_e) + (1 + k_e)^2} + \ldots + \frac{D_n}{(1 + k_e)^n} \]

\[ = \frac{D_0(1 + g)}{(1 + k_e)} + \frac{D_0(1 + g)^2}{(1 + k_e)^2} + \ldots + \frac{D_0(1 + g)^n}{(1 + k_e)^n} \]

\[ \Rightarrow P_0 = \frac{D_0(1 + g)}{(k_e - g)}, \quad \text{for, } n = \infty \]

\[ = \frac{D_1}{k_e - g} \]

[derivation: page 154]

Dividend Valuation Models: Gordon Model (continued . . .)

- From the Gordon model we have,

  \[ P_0 = \frac{D_1}{k_e - g} \]

  \[ R^e = \frac{C}{P_i} + \frac{P_{i+1} - P_i}{P_i} \]

  \[ = \left( \text{current yield} \right) + \left( \text{capital gain} \right) \]

- \( k_e \), also known as the Required rate of return
- Subjective and idiosyncratic
Dividend Valuation Models:
Gordon Model (continued . . .)

- It is assumed that, $g$ is constant
  - Unlikely that $g$ will remain constant forever
  - $g$ can be an estimate of the average growth rates
  - However, even if $g$ changes after an extended period, the errors of distant cash flow are small
- It is assumed that, $k_e > g$
  - Reasonable assumption because if the opposite is true then the firm, in the long run, will be impossibly large.
- Need to form expectations
  - Not just the immediate dividend, $D_1$, but also about $g$
  - About the information that is needed to estimate $k_e$.

Risk and Information
Gordon Model (continued . . .)

- To estimate $\{g, k_e\}$, need to asses the relative riskiness of the stocks
- Riskiness of a stock arises from the facts
  - Future of the corporations unknown (uncertainty)
  - Stockholders are residual claimants
- Assessment of risk requires knowledge of the company and the economy
Idiosyncratic Risk Assessment
Buying a used car

Example: Two people bidding for a car
Buyer 1 (economist): reservation price $5,000
Buyer 2 (mechanical engineer): reservation price $7,000
Sale price = $5,100

- Information → valuation. Superior information increases the value of the asset
- Price is set by the highest bidder (which is not necessarily the highest price the asset can fetch)
- Market allocates assets to the party that values it the most (and can take the best advantage of it)

Idiosyncratic Risk Assessment
Numerical Example: Buying a Stock

\[ D_1 = 2, \quad \text{Estimated } g = 3\% \, \text{(MSNBC analyst)} \]
\[ k_e = ?, \quad P_0 = ? \]

\[ P_0 = \frac{D_1}{k_e - g} \]

<table>
<thead>
<tr>
<th>Investor</th>
<th>( k_e ) (%)</th>
<th>( P_0 ) ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (plumber)</td>
<td>15</td>
<td>16.67</td>
</tr>
<tr>
<td>B (asked a stock broker)</td>
<td>12</td>
<td>22.22</td>
</tr>
<tr>
<td>C (dating the CEO)</td>
<td>10</td>
<td>28.57</td>
</tr>
</tbody>
</table>
Gordon Model: Applications

- **Monetary policy**
  If fed lowers interest rate
  - Return on bonds ↓ ⇒ $k_e$ ↓
  - Economy simulates ⇒ $g$ ↑
  So, $P_0$ ↑

- **Unforeseen shocks (ex: 9/11, Enron)**
  Increased uncertainly about the future
  - $k_e$ ↑
  - $g$ ↓
  So, $P_0$ ↓

$$P_0 = \frac{D_1}{k_e - g}$$