Equity Valuation

Professor Lasse H. Pedersen

Outline
- Valuation concepts
- Fundamental value (or, intrinsic value)
- Dividend Discount Model
- Gordon’s Growth Model
- Valuation ratios
- PV and NPV

Valuation Concepts
- Market price
- Fundamental value (or, intrinsic value)
- Book value
- Liquidation value: lower bound on market value (otherwise takeover target)
- Replacement cost: if market price is far above replacement cost, competitors are likely to move into this business
Fundamental Value

- We want to find a firm’s fundamental value $V_t$.
- First, we find the required rate of return, $E(R)$, using CAPM.
- Then, we use that the return is equal to:
  \[ E(R) = \frac{E(D_{t+1}) + E(V_{t+1})}{V_t} - 1 \]
- Therefore, we can express $V_t$ as a function of $V_{t+1}$ and $D_{t+1}$.
  \[ V_t = \frac{E(D_{t+1}) + E(V_{t+1})}{1 + E(R)} \]

Dividend Discount Model (DDM)

- Use the fundamental-value equation repeatedly:
  \[ V_0 = \frac{E(D_1) + E(V_1)}{1 + E(R)} = \frac{E(D_1) + E(V_1)}{1 + E(R)} \cdot \frac{E(D_2) + E(V_2)}{1 + (1 + E(R))} \cdot \frac{E(D_3) + E(V_3)}{1 + (1 + E(R))^2} \cdot \frac{E(D_4) + E(V_4)}{1 + (1 + E(R))^3} \cdot \ldots \]

Warren Buffett

- “Intrinsic value is an all-important concept that offers the only logical approach to evaluating the relative attractiveness of investments and businesses. Intrinsic value can be defined simply: It is the discounted value of the cash that can be taken out of a business during its remaining life.”
- Example: Book value / intrinsic value of a college education
Gordon’s Growth Model (GGM)

- Suppose that expected dividends grow at a rate $g$, that is,
  \[ E(D_1) = (1+g)D_0 \]
  \[ E(D_2) = (1+g)^2D_0 \]
  etc.

- Use the Dividend-Discount Model:
  \[ V = \frac{E(D_1)}{1+R} + \frac{E(D_2)}{(1+R)^2} + ... \]
  \[ = \frac{D_0(1+g)}{1+R} + \frac{D_0(1+g)^2}{(1+R)^2} + ... \]
  \[ = \frac{D_0(1+g)}{E(R) - g} \]

Example 1

- In early 1999, Texas Instruments (TXN) had
  - just paid dividends of 0.36 per share
  - a beta of 1.40
  - an estimated growth rate of 16.1%

- The risk-free rate was 4.75%

- The risk premium was estimated to 8.5%

Based on these estimates, what was the fundamental value of TXN in early 1999?

Valuation Ratios and Relative Valuation

- Price-dividend ratio. If $V_0 = P_0$ and GGM applies then:
  \[ \frac{P_0}{D_0} = \frac{1+g}{E(R) - g} \]

- Price-earnings ratio. With a "retention ratio" of $b$, $D_0 = (1-b)E_0$. Hence, if GGM applies then
  \[ \frac{P_0}{E_0} = \frac{(1+g)(1-b)}{E(R) - g} \]

- Price-to-book ratio

- Price-to-sales ratio
Example 2

- In early 1999, TXN’s P/E ratio was 43.5
- Suppose Motorola had an earnings per share of 3
  - what would be a P/E-based estimate of Motorola’s stock price?
  - which assumptions are this estimate based on?
- Assume
  - GGM applies
  - The required return was $E(R_{TXN}) = R_f + \beta_{TXN} [E(R_m) - R_f] = 16.65\%$
  - The payout ratio was known to be 0.13, that is, the retention ratio was $b = 0.87$.

What is the market’s (implicit) estimate of Texas Instruments’ growth rate?

Two-Stage DDM

- A company can grow exceptionally for a while, but at some point the company matures and its growth normalizes.
- Suppose that you estimate that a company’s growth will reach its “long-run” level of $g$ after, say, 3 years.
- Then, in 3 years its price is $P_3 = \frac{(1 + g)D_3}{E(R)} - g$

- Based on estimates of the next 3 years dividends, the earnings after 4 years, the long-run earnings growth and retention rate, today’s value is:

$$P_0 = \frac{E(D_1)}{1 + E(R)} + \frac{E(D_2)}{(1 + E(R))^2} + \frac{E(D_3)}{(1 + E(R))^3} + \frac{E(D_4)}{(1 + E(R))^4} + \frac{E(P^*)}{(1 + E(R))^4}$$

- Instead of estimating future growth rate, one can estimate future P/D ratio, or P/E ratio and retention ratio.

Example 3

- Suppose in early 1999 you estimate
  - TXN’s 1999 dividend per share will be 0.40
  - TXN’s 2000 dividend per share will be 0.457
  - TXN’s 2001 dividend per share will be 0.60
  - TXN’s required return is constant at 16.65\%
  - After 2002, TXN’s (dividend) growth rate will be 16.1\%

- Using the two-stage DDM, what is the fundamental value in early 1999?
Price and NPV

- $P_0 = PV(\text{future dividends})$
  - $= PV(\text{future net cash flows from assets in place})$
  - $+ NPV(\text{new projects})$

- $NPV(\text{new projects})$ is also called the $NPV(\text{growth opportunities})$

- Firms
  - use the CAPM to compute the required return
  - use this discount rate to compute NPV
  - capital budgeting: take positive NPV projects