

Equity Valuation

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Outline

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

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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

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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:

$$\begin{aligned} V_0 &= \frac{E(D_1) + E(V_1)}{1 + E(R)} \\ &= \frac{E(D_1)}{1 + E(R)} + \frac{E(D_2) + E(V_2)}{(1 + E(R))^2} \\ &= \frac{E(D_1)}{1 + E(R)} + \frac{E(D_2)}{(1 + E(R))^2} + \frac{E(D_3)}{(1 + E(R))^3} + \frac{E(D_4)}{(1 + E(R))^4} + \dots \end{aligned}$$

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,

$$E(D_1) = (1+g)D_0, E(D_2) = (1+g)^2 D_0, \text{ etc.}$$

- Use the Dividend-Discout Model:

$$\begin{aligned} V_0 &= \frac{E(D_1)}{1+E(R)} + \frac{E(D_2)}{(1+E(R))^2} + \frac{E(D_3)}{(1+E(R))^3} + \dots \\ &= \frac{D_0(1+g)}{1+E(R)} + \frac{D_0(1+g)^2}{(1+E(R))^2} + \frac{D_0(1+g)^3}{(1+E(R))^3} + \dots \\ &= \frac{D_0(1+g)}{E(R)-g} = \frac{E(D_1)}{E(R)-g} \end{aligned}$$

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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?

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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

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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?

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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:

$$P_0 = \frac{E(D_1)}{1+E(R)} + \frac{E(D_2)}{(1+E(R))^2} + \frac{E(D_3)}{(1+E(R))^3} + \frac{E(P_3)}{(1+E(R))^3}$$

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

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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?

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Price and NPV

- $P_0 = \text{PV}(\text{future dividends})$
 - =PV(future net cash flows from assets in place)
 - +NPV(new projects)
- NPV(new projects) is also called the
NPV(growth opportunities)
- Firms
 - use the CAPM to compute the required return
 - use this discount rate to compute NPV
 - capital budgeting: take positive NPV projects
