

# **CFA LEARNING OUTCOMES DECODED**

In our series *Learning Outcomes Decoded* we break down a single Learning Outcome Statement (LOS) from the CFA level 1 curriculum. This article is written by Dave Kaczorowski, CFA. Dave is the Content Manager of the CFA team at the Princeton Review, and teacher of the live online review sessions. He is a professor of finance at the University of San Francisco.

## EQUITY INVESTMENTS: THE GORDON GROWTH MODEL

**LOS: Calculate and interpret the intrinsic value of equity security based on the Gordon (constant) growth dividend discount model or a two-stage dividend discount model, as appropriate**

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This LOS is a major point in the valuation section of the learning module. It is a companion to the LOS on present value, which is all highly testable material. Understanding this LOS requires a knowledge of the equity valuation using the Gordon Growth Model on both a conceptual and a quantitative level.

### Gordon Growth Model

To obtain a valuation (i.e., intrinsic value) of a stock requires estimating an infinite series of expected dividends—a rather difficult task. To simplify the process, an analyst can employ the Gordon (constant) Growth Model to discount future dividends, assuming a constant dividend growth rate (often used with mature, non-cyclical companies) and that the discount rate exceeds the dividend growth rate, as follows:

$$V_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}$$

$V_0$  = Price Today

$g$  = Dividend growth rate

$D_0$  = Dividend today

$r$  = Discount rate

$D_1$  = Dividend a year from now

The constant long-term dividend growth rate can be computed as follows:

$$g = b \times \text{ROE}$$

$g$  = Dividend growth rate

$b$  = Earnings retention rate = (1 – Dividend payout ratio)

ROE = Return on equity

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Determination of discount rate is beyond the scope of this section topic. Comparing the resulting intrinsic value calculated using the Gordon Growth Model to the stock's price, trading will dictate whether the stock is considered over or undervalued.

### Single-Stage Gordon Growth Model

An analyst wishes to value Altria's stock price where the current dividend is \$5.00, payable today, the dividend payout ratio is 75%, and ROE is 20%. She further assumes an 8.5% discount rate. The intrinsic value of Altria is calculated as follows:

$$g = (1 - .75) * 0.20 = 0.05 = 5\%$$

$$V_0 = (\$5.00 * (1 + 0.05)) / (0.085 - 0.05) = \$150.00$$

If Altria is currently trading at \$155.00, it is overvalued based on the analyst's calculation above.

### Multi-Stage Gordon Growth Model

To obtain a valuation (i.e., intrinsic value) of a stock with one or more different future dividend growth rates, the Gordon Growth Model is slightly adjusted as follows:

$$V_0 = \int_{t=1}^n \frac{D_0 (1 + g_s)^t}{(1 + r)^t} + \frac{V_n}{(1 + r)^n}$$

$$V_n = \frac{D_{n+1}}{r - g_L}$$

$$D_{n+1} = D_0 (1 + g_s)^n \times (1 + g_L)$$

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In the case of a stock with two dividend growth rates (i.e., one dividend growth rate in Year 1 and a constant assumed long-term growth rate thereafter), both the dividend one year from now is discounted to present value and an estimate of the stock's price at the end of Year 1 (using the Gordon Growth Model) is discounted back to present value. The addition of the two figures results in the calculated intrinsic value.

### Example: Multi-Stage Gordon Growth Model

The same analyst above now believes Altria will grow its dividend by 10% in Year 1, thereafter growing dividends by 5%/year. Using all other assumptions as per above, Altria's value is calculated as follows:

$$\text{Present value of } V_1 = [(\$5.00 * ((1 + 0.10) * (1 + 0.05))) / (0.085 - 0.05)] / (1 + 0.085)^1 = \$152.07$$

$$+ \text{Present value of } D_1 = [(\$5.00 * (1 + 0.10)) / (1 + 0.085)^1] = \$5.07$$

$$\$152.07 + \$5.07 = \$157.14$$

As Altria currently sells at \$155, the analyst now views the stock as undervalued.

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### PRACTICE QUESTION

A portfolio manager wishes to know if Intel is over or undervalued. Intel's current dividend is \$10.00, payable today, the dividend growth rate is assumed to be 20% in the next year and 5% per year thereafter, and the discount rate is 10%. Intel's current price is \$225. The portfolio manager views Intel stock as

- A. Undervalued
- B. Fairly valued
- C. Undervalued

**A is correct.** Present value of  $V_1 = [(\$10.00 * ((1 + 0.20) * (1 + 0.05))) / (0.10 - 0.05)] / (1 + 0.10)^1 = \$232.26$  + Present value of  $D_1 = [(\$10.00 * (1 + 0.20)) / (1 + 0.10)^1 = \$10.91$

$$\$232.26 + \$10.91 = \$243.17$$

As Intel currently sells at \$225, the portfolio manager would view the stock as undervalued and purchase it for his portfolio.