# Gordon Dividend Discount Model (DDM) vs. FCFE Valuation Models

Two popular models for valuing equity are the DDM and FCFE models. The DDM is sometimes referred to the Gordon constant growth model, because it assumes the firm is growing at constant growth rate. Both of these models are perpetuities of cash flows that have been paid to the shareholder (i.e., $D_0$) or cash flows that are available to be paid to the shareholder (i.e., $FCFE_0$). So not only do both models rely on constant growth, but also constant growth to infinity. Some may question the reality of a firm ongoing to infinity, but consider that after about 30 years, the cash flows are near zero due to discounting, and a firm paying dividends for 30 years is very plausible.

## DDM

$$V_E = \frac{D_0(1+g)}{K_E - g}$$

Where:
- $D_0$ = Trailing 12 month annualized dividend
- $K_E$ = Cost of equity
- g = growth rate of net income
- $V_E$ = Value of equity

## FCFE

$$V_E = \frac{FCFE_0(1+g)}{K_E - g}$$

Where:
- $FCFE_0$ = Cash available for payout to shareholders
- $K_E$ = Cost of equity
- g = growth rate of net income
- $V_E$ = Value of equity

What becomes immediately clear when comparing these two models is that $D_0$ must equal $FCFE_0$ for these two models to both be correct, or a change in g must compensate equivalently for a change in $D_0$ and $FCFE_0$. Let's first completely define these two models, then come back to the question of what it takes for these two models to equal.

For both models, the cost of equity ($K_E$) can be derived via the CAPM model (see other blog posts for details regarding CAPM), and the growth rate of net income equals the retention ratio multiplied by the ROE:

**$K_E = RFR + (MRP)\beta$**

Where:
- RFR = Risk-Free-Rate, current 30-yr U.S. T-Bond rate
- MRP = Market Risk Premium, historic spread between the S&P 500 and the RFR
- β = Slope between linear fit of real yields (inflation adjusted and w/ dividends) of S&P 500 (x-axis) against firm's stock (y-axis)

And for both models the Net Income growth rate (g) is the same, and can be derived from the following equation:

**$g = RR \times ROE$**

Where:
- RR = One minus the Dividend Payout Ratio (1-PR)
- PR = Dividend Payout Ratio which equals ( $D_0$ / Net $Income_0$ )
- ROE = Return on Equity which equals ( Net $Income_0$ / Book $Equity_0$ )

Remember that Book Equity includes the par value of common stock, additional paid-in capital for common stock, and retained earnings. Also, the subscripts of zero imply current values. The Dividends that have already been paid out ($D_0$) comes from Net Income, with this defining the PR, RR, and thus the growth rate of the firm.

So what is $FCFE_0$, and where does it come from? It is defined by the following formula:

Net Income$_0$
+Depreciation and Amortization (DA)
-Capital Expenditures (CapEx)
-Change in Net Operating Working Capital (ΔNOWC)
-Debt Principal Payments
+New Debt Issuances
$FCFE_0$

As you can see, it is also Net Income based, and adjusts for DA since these are not cash flows, and adjusts for CapEx and the ΔNOWC, and then adjusts for cash being paid out and received by the debt holders, because this is money directly available to the shareholders. All of these adjustments are the equivalent of a retention ratio, and will determine the growth rate of the firm. What $FCFE_0$ truly represents then, is the cash that is available for payout to the shareholder (after capitalizing the company), and this is the equivalent then of the dividend assuming that all cash available for payout is paid as a dividend to the shareholder.

**If the reinvestment in the firm is reflected in the growth rate of Net Income, and if the $FCFE_0$ is paid out to the shareholder, then the DDM and $FCFE_0$ should equal.** If the firm chooses to not pay out all of its $FCFE_0$ to its shareholders, then this will accumulate on the balance sheet in the form of excess cash and marketable securities, which would then need to be subtracted from the $V_E$ obtained via the $FCFE_0$ model for it to equal the DDM model's $V_E$. It is subtracted because this implies that the dividend is not at 100% of $FCFE_0$, so the DDM model will produce a lower value due to the reduced $D_0$.

Another method for calculating the $FCFE_0$ is to realize that the firm has a set debt ratio δ (i.e., [debt / (debt + equity)]). This means that the adjustments for the payment and issuance of debt can be replaced by the ongoing debt ratio via the following formulas:

$$FCFE_0 = \text{Net Income} + (1 - \delta)(DA - CapEx - \Delta NOWC)$$

$$\delta = \frac{D}{D+E}$$

Where: δ = Debt ratio
D = Book debt value
E = Book equity value

If the firm has been in the practice of buying back stock and/or adjusting their capital structure by buying back stock via the issuance of new debt, then the dividend is not an accurate payout

measure, and an adjusted payout ratio should be applied. This will have direct ramifications on the growth rate as well, and will impact the DDM model.

$$\text{Adjusted PR} = \frac{\text{Dividends + Stock Buybacks - Long-Term Debt Issuance}}{\text{Net Income}}$$

This adjusted PR should be applied to the DDM model in an identical fashion as the original PR was applied. Note that $FCFE_0$ does not have to be paid out as a dividend, but could be paid out in the form of a stock buyback as well, so the $FCFE_0$ and DDM models are once again in unison.

If excess cash and marketable securities have been allowed to build on the balance sheet as a result of $FCFE_0$ not being returned to the shareholders, then the ROE should be adjusted as well to reflect the return for operations and not investments.

$$\text{Adjusted ROE} = \frac{\text{Net Income - After Tax Income from Excess Cash and Mkt. Securities}}{\text{Book Value of Equity - Excess Cash and Mkt. Securities}}$$

Also note that in this case, the Dividend ( $D_0$ ) would instead equal the dividend paid out plus the stock repurchased.

*This post is based on theory and models originally derived by Aswath Damodaran from NYU.*