

DISCOUNTED CASHFLOW MODELS: WHAT THEY ARE AND HOW TO CHOOSE THE RIGHT ONE..

THE FUNDAMENTAL CHOICES FOR DCF VALUATION

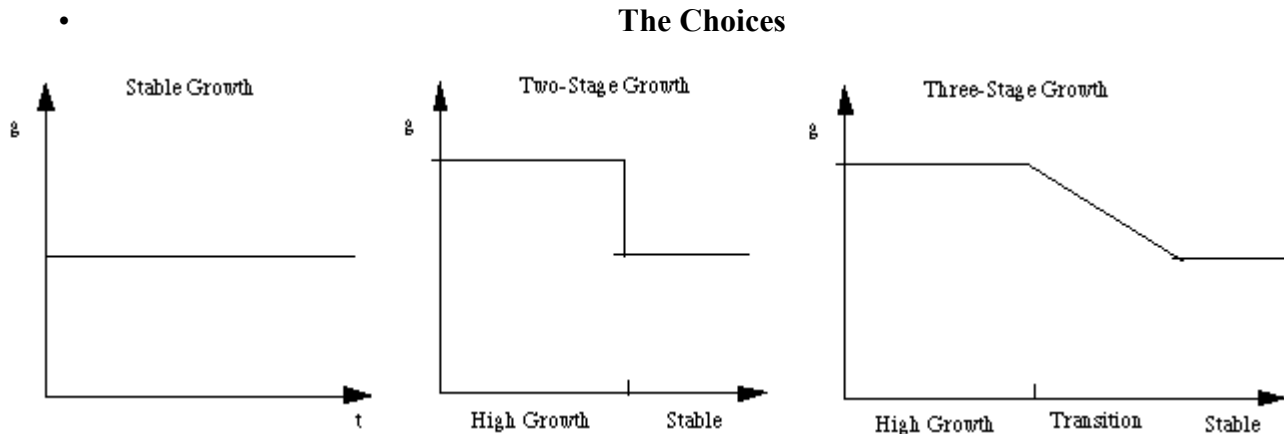
- **Cashflows to Discount**
 - Dividends
 - Free Cash Flows to Equity
 - Free Cash Flows to Firm
- **Expected Growth**
 - Stable Growth
 - Two Stages of Growth: High Growth -> Stable Growth
 - Three Stages of Growth: High Growth -> Transition Period -> Stable Growth
- **Discount Rate**
 - Cost of Equity
 - Cost of Capital
- **Base Year Numbers**
 - Current Earnings / Cash Flows
 - Normalized Earnings / Cash Flows

WHICH CASH FLOW TO DISCOUNT...

- **The Discount Rate should be consistent with the cash flow being discounted**
 - Cash Flow to Equity -> Cost of Equity
 - Cash Flow to Firm -> Cost of Capital
- **Should you discount Cash Flow to Equity or Cash Flow to Firm?**
 - *Use Equity Valuation*
 - (a) for firms which have stable leverage, whether high or not, and
 - (b) if equity (stock) is being valued
 - *Use Firm Valuation*
 - (a) for firms which have high leverage, and expect to lower the leverage over time, because
 - debt payments do not have to be factored in
 - the discount rate (cost of capital) does not change dramatically over time.
 - (b) for firms for which you have partial information on leverage (eg: interest expenses are missing..)
 - (c) in all other cases, where you are more interested in valuing the firm than the equity. (Value Consulting?)
- **Given that you discount cash flow to equity, should you discount dividends or Free Cash Flow to Equity?**
 - *Use the Dividend Discount Model*
 - (a) For firms which pay dividends (and repurchase stock) which are close to the Free Cash Flow to Equity (over a extended period)

- (b) For firms where FCFE are difficult to estimate (Example: Banks and Financial Service companies)
- *Use the FCFE Model*
 - (a) For firms which pay dividends which are significantly higher or lower than the Free Cash Flow to Equity. (What is significant? ... As a rule of thumb, if dividends are less than 75% of FCFE or dividends are greater than FCFE)
 - (b) For firms where dividends are not available (Example: Private Companies, IPOs)

WHAT IS THE RIGHT GROWTH PATTERN...



THE PRESENT VALUE FORMULAE

- For Stable Firm:
$$V_0 = \frac{CF_1}{r - g_n}$$
- For two stage growth:
$$V_0 = \frac{CF_0 \cdot (1+g) \cdot \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r - g} + \frac{CF_{n+1}}{(r - g_n)(1+r)^n}$$
- For three stage growth:
$$V_0 = \sum_{t=1}^{t=n} \frac{CF_t \cdot (1+g_t)^t}{(1+r)^t} + \sum_{t=n+1}^{t=rc} \frac{CF_t}{(1+r)^t} + \frac{CF_{rc+1}}{(r - g_n)(1+r)^n}$$

Definitions of Terms

V_0 = Value of Equity (if cash flows to equity are discounted) or Firm (if cash flows to firm are discounted)

CF_t = Cash Flow in period t; *Dividends* or *FCFE* if valuing equity or *FCFF* if valuing firm.

r = Cost of Equity (if discounting Dividends or FCFE) or Cost of Capital (if discounting FCFF)

g = Expected growth rate in Cash Flow being discounted

g_a = Expected growth in Cash Flow being discounted in first stage of three stage growth model

g_n = Expected growth in Cash Flow being discounted in stable period

n = Length of the high growth period in two-stage model

n_1 = Length of the first high growth period in three-stage model

$n_2 - n_1$ = Transition period in three-stage model

WHICH MODEL SHOULD I USE?

- Use the growth model only if cash flows are positive
- *Use the stable growth model, if*
 - the firm is growing at a rate which is below or close (within 1-2%) to the growth rate of the economy
- *Use the two-stage growth model if*
 - the firm is growing at a moderate rate (... within 8% of the stable growth rate)
- *Use the three-stage growth model if*
 - the firm is growing at a high rate (... more than 8% higher than the stable growth rate)

SUMMARIZING THE MODEL CHOICES

	Dividend Discount Model	FCFE Model	FCFF Model
Stable Growth Model	<ul style="list-style-type: none"> • Growth rate in firm's earnings is stable. (g of $g_{\text{firm}} = g_{\text{economy}} + 1\%$) • Dividends are close to FCFE (or) FCFE is difficult to compute. • Leverage is stable 	<ul style="list-style-type: none"> • Growth rate in firm's earnings is stable. ($g_{\text{firm}} = g_{\text{economy}} + 1\%$) • Dividends are very different from FCFE (or) Dividends not available (Private firm) • Leverage is stable 	<ul style="list-style-type: none"> • Growth rate in firm's earnings is stable. ($g_{\text{firm}} = g_{\text{economy}} + 1\%$) • Leverage is high and expected to change over time (unstable).
Two-Stage Model	<ul style="list-style-type: none"> • Growth rate in firm's earnings is moderate. • Dividends are close to FCFE (or) FCFE is difficult to compute. • Leverage is stable 	<ul style="list-style-type: none"> • Growth rate in firm's earnings is moderate. • Dividends are very different from FCFE (or) Dividends not available (Private firm) • Leverage is stable 	<ul style="list-style-type: none"> • Growth rate in firm's earnings is moderate. • Leverage is high and expected to change over time (unstable).
Three-Stage Model	<ul style="list-style-type: none"> • Growth rate in firm's earnings is high. 	<ul style="list-style-type: none"> • Growth rate in firm's earnings is high. 	<ul style="list-style-type: none"> • Growth rate in firm's earnings is high.

- Dividends are close to FCFE (or) FCFE is difficult to compute.
- Leverage is stable
- Dividends are very different from FCFE (or) Dividends not available (Private firm)
- Leverage is stable
- Leverage is high and expected to change over time (unstable).

GROWTH AND FIRM CHARACTERISTICS

	<i>Dividend Discount Model</i>	<i>FCFE Discount Model</i>	<i>FCFF Discount Model</i>
High growth firms generally	<ul style="list-style-type: none"> • Pay no or low dividends • Earn high returns on projects (ROA) • Have low leverage (D/E) • Have high risk (high betas) 	<ul style="list-style-type: none"> • Have high capital expenditures relative to depreciation. • Earn high returns on projects • Have low leverage • Have high risk • narrow the difference between cap ex and depreciation. (Sometimes they offset each other) 	<ul style="list-style-type: none"> • Have high capital expenditures relative to depreciation. • Earn high returns on projects • Have low leverage • Have high risk • narrow the difference between cap ex and depreciation. (Sometimes they offset each other)
Stable growth firms generally	<ul style="list-style-type: none"> • Pay large dividends relative to earnings (high payout) • Earn moderate returns on projects (ROA is closer to market or industry average) • Have higher leverage • Have average risk (betas are closer to one.) 	<ul style="list-style-type: none"> • Earn moderate returns on projects (ROA is closer to market or industry average) • Have higher leverage • Have average risk (betas are closer to one.) 	<ul style="list-style-type: none"> • Earn moderate returns on projects (ROA is closer to market or industry average) • Have higher leverage • Have average risk (betas are closer to one.)

SHOULD I NORMALIZE EARNINGS?

- *Why normalize earnings?*
 - The firm may have had an exceptionally good or bad year (which is not expected to be sustainable)
 - The firm is in financial trouble, and its current earnings are below normal or negative.
- *What types of firms can I normalize earnings for?*
 - The firms used to be financially healthy, and the current problems are viewed as temporary.

- The firm is a small upstart firm in an established industry, where the average firm is profitable.

HOW DO I NORMALIZE EARNINGS?

- If the firm is in trouble because of a recession, and its size has not changed significantly over time,
- *Use average earnings over an extended time period for the firm*

Normalized Earnings = Average Earnings from past period (5 or 10 years)

- If the firm is in trouble because of a recession, and its size has changed significantly over time,
- *Use average Return on Equity over an extended time period for the firm*

Normalized Earnings = Current Book Value of Equity * Average Return on Equity (Firm)

- If the firm is in trouble because of firm-specific factors, and the rest of the industry is healthy,
- *Use average Return on Equity for comparable firms*

Normalized Earnings = Current Book Value of Equity * Average Return on Equity (Comparables)