Discounted Cashflow Model (DCF)

A fundamental valuation method

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September 18, 2024

Background

What is a DCF

- Case study: Link to AAPL
- It is a valuation method.
- Broadly, it is a method that is used to estimate the value of an asset based on its **future cash flows**.
- It can be applied for companies, projects, anything that has cash flows and needs a fundamental value.
- It is an **intrinsic valuation** method, which means that the valuation framework is independent from external factors, relies solely on the firm's, project's ability to create cash flows.
- Alternative valuation technique: *Relative Valuation* (to competitors).

Steps needed for a DCF model

1. Forecast and calculate **Free Cash Flow**.
2. Calculate the **Weighted Average Cost of Capital (WACC)**.
3. Calculate the **Terminal Value**.
4. **Discount** the Free Cash Flow and the Terminal Value.
5. Calculate the *implied* share price.

1. Forecast and calculate Free Cash Flow

Free Cash flow (FCF)

- It is the cash flow available for both debt and equity holders after the business pays for everything it needs to continue its operation.
- Payments in that sense mean paying for operating expenses, capital expenditure, investments.
- The more Free Cash flow a company has, the more valuable it is, and more attractive it is for investors, because it is able to pay down its debt or/and invest in new business opportunities.

1. Forecast and calculate Free Cash Flow

Free Cash flow formula

- Departing from **EBIT** (Earnings Before Interest and Taxes).
- After deducting taxes,
- and adding back appreciation/depreciation *(because those are not cash flow related items)*,
- subtracting Capital Expenditures,
- and adding the net change in the Working Capital (*increase is negative*) yields the **FCF**.

$$\begin{aligned}\textbf{Free Cash flow} = &\text{EBIT} \times (1 - \text{tax rate}) - \text{Capital Expenditure} \\ &+ \text{Depreciation/Appreciation} \\ &+ \text{changes in working capital}\end{aligned}$$

2. Calculating the Weighted Average Cost of Capital (WACC)

WACC

- The WACC measures the cost of financing for a company.
- Financing can come in the form of **Debt** and **Equity**.
- The cost of debt financing is the interest payment, the cost of equity financing comes from the expected return on the stock (Capital Asset Pricing Model).
- The expected return on equity must reflect the level of risk that the individual company embodies.

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

2. Calculating the Weighted Average Cost of Capital (WACC)

WACC

$$WACC = \frac{E}{V} \times R_e + \frac{D}{V} \times R_d \times (1 - Tax)$$

(E) is the market value of the firm's equity, *(V)* is the total market value of both the firm's equity and debt, *(Re)* is the cost of equity, *(D)* is the market value of the firm's debt, *(Rd)* is the cost of debt, *(Tax)* is the corporate tax rate.

3. Calculating the Terminal Vaue

Terminal Value

- The Terminal Value is the is the value of the business after the forecasted period.
- Terminal Value uses growth assumptions that goes to infinity *(perpetuity)*.

$$TV = \frac{FCF_n \times (1+g)}{WACC - g}$$

TV is the terminal value *(FCFn)* is the free cash flow at period n (the final forecasted period's FCF), g is the growth rate (often the GDP growth rate is implied), *WACC* is the weighted average cost of capital.

4. Discounting of the FCF and Terminal Value

Discounting

- Discounting is needed in order to bring cash flows from different periods to the present and therefore making them additive.

$$PV = \frac{FCF_{t1}}{(1+WACC)^1} + \frac{FCF_{t2}}{(1+WACC)^2} + \ldots + \frac{FCF_{tn}}{(1+WACC)^n} + \frac{TV}{(1+WACC)^n}$$

(PV) is the present value *(FCFti)* is the free cash flow at time *(i)* *(WACC)* is the weighted average cost of capital *(TV)* is the terminal value *(n)* is the final period in the forecast.

Enterprise Value, Equity Value

- The Enterprise Value consists of the market value of the Debt and Equity.
- Specifically: it is the Net Debt *(Debt-Cash)* and the value of the Equity.

$$EV = Net\ Debt + Equity = (Debt - Cash) + Equity$$

$$Implied\ Share\ Price = \frac{Equity}{Number\ of\ Shares} = \frac{EV - (Debt - Cash)}{Number\ of\ Shares}$$

Alternative Valuation Methods

- **Dividend Discounting Model** (Gordon Model) values a company based on only the present value of its expected future dividends.
- **Economic Value Added** (Residual Income Model) method focuses on the companys ability to generate returns above its cost of capital. EVA is calculated as the net operating profit after taxes (NOPAT) minus a charge for the capital employed (cost of capital times the capital).
- **Real Option Valuation** considers the value of potential future opportunities or strategic options, such as delaying, expanding, or abandoning projects.

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