Course Intro and Fundamental Valuation

EQUITY VALUATION IN R

Cliff Ang
Senior Vice President, Compass Lexecon

Time Value of Money

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Time Value of Money

- You will need to be compensated to forego receiving $100 today in favor of receiving $100 tomorrow. Why?
  - Uncertainty / Risk
  - The higher the risk, the larger the compensation
- $100 today is worth more than $100 tomorrow

ONE YEAR

$$\frac{\$100}{(1+10\%)^1} = \$91$$

```
fv <- 100
r <- 0.10
fv / (1 + r)^1
```

```
90.90909
```

```
# Check
90.90909 * (1 + r)
```

```
100
```

TWO YEARS

$$\frac{\$100}{(1+10\%)^2} = \$83$$

```
fv <- 100
r <- 0.10
fv / (1 + r)^2
```

```
82.64463
```

```
# Check
82.64463 * (1 + r)^2
```

```
100
```

Discount Cash Flow valuation

- Free Cash Flow to Equity (FCFE)
- Free Cash Flow to Firm (FCFF)

FCFE vs. FCFF Models

Market Value Balance Sheet:

Assets = Liabilities + Equity

- Same accounting identity must hold but in ***Market Value*** not ***Book Value***

Free Cash Flow to Equity

- Direct valuation of the Value of Equity
- Cost of Equity (CAPM)

Let's practice!

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The Free Cash Flow to Equity Model

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What is "Free Cash Flow"?

- "Free Cash Flows" are cash flows after you have paid out
  - All your suppliers, employees, lenders, and government (taxes) ***and***
  - Setting aside money for capital investments and additional working capital needs ***and***
  - Net of new borrowings and debt repayments
- No effect on firm's projected operations
- No effect on firm's projected growth

After-Tax Income

[1] **Revenues**

 # Also called "Sales"

[2] Less: Cost of Goods Sold

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[3] **Gross Profit**

[4] Less: Operating Expenses

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[5] **Operating Income or EBIT**

 # Earnings Before Interest & Taxes

[6] Less: Interest Expense

 # Compensation to debt holders

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[7] **Pre-Tax Income**

[8] Less: Taxes

 # Payment to the government

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[9] **After-Tax Income**

 # Also called "Net Income"

Adjustments to Arrive to FCFE

[9] **After-Tax Income**

[10] Add: Depreciation and Amortization

 # Non-cash charge. Cash spent at time of purchase

[11] Less: Capital Expenditures

 # Cash spent on capital investments

[12] Less: Increases in Working Capital

 # Cash spent on additional working capital needs

==========

[13] **Free Cash Flow to Equity**

Terminal Value

Terminal Value (TV) is the value of the cash flows beyond the forecast period

Commonly estimated using the **Perpetuity with Growth Model**, which is

$$TV = \frac{FCFE_{T+1}}{k_e - g} = \frac{FCFE_T * (1+g)}{k_e - g}$$

where

- $FCFE_{T+1}$ = Free Cash Flow to Equity the year after the end of the forecast period
- k_e = Cost of Equity
- g = Perpetuity Growth Rate (PGR)

Terminal Value in R

Suppose you have a 5 year forecast period, such that $FCFE_5 = \$100$. Assume that g = 3% and k_e = 15%, then in R:

```
FCFE_5 <- 100
g <- 0.03
k_e <- 0.15
FCFE_5 * (1 + g) / (k_e - g)
```

```
858.3333
```

Let's practice!

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Calculating Equity Value

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Present Value

The firm's equity value is equal to:

$$V = \sum_{t=1}^{T} \frac{FCFE_t}{(1+k_e)^t} + \frac{TV_T}{(1+k_e)^T}$$

The two terms on the RHS of the equation are as follows:

- Present Value of the FCFE during the projection period
- Present Value of the Terminal Value

PV of FCFE in R

Suppose the FCFE for each of the first five years is $100 million. Assuming a cost of equity of 15%, the present value of each cash flow is:

```
k_e <- 0.15
cf <- rep(100, 5)
cf <- data.frame(cf)
cf$period <- seq(1, 5, 1)
cf$pv_factor <- 1 / (1 + k_e)^cf$period
cf$pv <- cf$cf * cf$pv_factor
cf
```

```
  cf period pv_factor       pv
1 100      1 0.8695652 86.95652
2 100      2 0.7561437 75.61437
3 100      3 0.6575162 65.75162
4 100      4 0.5717532 57.17532
5 100      5 0.4971767 49.71767
```

```
pv_fcfe <- sum(cf$pv)
pv_fcfe
```

```
335.2155
```

PV of Terminal Value in R

```
tv_yr5 <- 858.333
k_e <- 0.15
pv_tv <- tv_yr5 / (1 + k_e)^5
pv_tv
```

```
426.7432
```

Equity Value and Equity Value Per Share

```
# Combine PV of FCFE and PV of Terminal Value
equity_value <- pv_fcfe + pv_tv
equity_value
```

```
761.9587
```

```
# To Convert to a Per Share Number
# Assume 15 million shares outstanding
shout <- 15
equity_per_share <- equity_value / shout
equity_per_share
```

```
50.79725
```

Let's practice!

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