Wrap-up of 15.402

The Big Picture: Part II - Valuation

A. Valuation: Free Cash Flow and Risk

- April 1 Lecture: Valuation of Free Cash Flows
- April 3 Case: Ameritrade

B. Valuation: WACC and APV

- April 8 Lecture: WACC and APV 1
- April 10 Lecture: WACC and APV 2
- April 15 Case: Dixon Corporation 1
- April 17 Case: Dixon Corporation 2
- April 24 Case: Diamond Chemicals
- **C. Project and Company Valuation**
- April 29 Lecture: Real Options
- May 1 Case: MW Petroleum Corporation
- May 6 Lecture: Valuing a Company
- May 8 Case: Cooper Industries, Inc.
- May 13 Case: The Southland Corporation

Final Exam

- Rules of the game:
  - → No laptops
  - → Closed books
  - → Two (2) letter-sized cheat sheets
  - → Bring a calculator

Aside: Incentives

- Whenever structuring a deal, be it on the RHS or the LHS of the balance sheet, make sure that all players have the right incentives.

- Example:
  1. You want to see a decent review of the course material.
  2. The professor is motivated by his teaching ratings (because he doesn't want the Dean to beat him up).

  ⇒ It is a bad idea to fill out the teaching rates before the professor has delivered the review! You are inviting moral hazard.

  ⇒ Similar to the Southland case – don't let crucial players cash out too early!

Valuation by Multiples:

- Assess the firm's value based on that of publicly traded comparables.
- **Cash-flow-based Value multiples:**
  → MV of firm/Earnings, MV of firm /EBITDA, MV of firm /FCF
- **Cash-flow-based Price multiples:**
  → Price/Earnings (P/E), Price/EBITDA, Price/FCF
- **(Book) Asset-based multiples:**
  → MV of firm/BV of assets, MV of equity/BV of equity

Procedure

- **Hope:** Firms in the same business should have similar multiples (e.g. P/E).
  → Requires similar levels of risk.
  → Requires similar expected growth rates.
- **STEP 1:** Identify firms in same business as the firm you want to value.
- **STEP 2:** Calculate P/E ratio for comps and come up with an estimate of P/E for the firm you want to value (e.g. take the average of comps' P/E).
- **STEP 3:** Multiply the estimated P/E by the actual Net Income of the firm you want to value.

Remarks

- For firms with no earnings or limited asset base (e.g. hi-tech),
  - → price-to-patents multiples,
  - → price-to-subscribers multiples,
  - → or even price-to-PhD. multiples!
- For transactions, can also use multiples for comparable transactions (e.g. similar takeovers).
- Multiples based on equity value (or stock price, e.g. P/E) as opposed to total firm value ignore effect of leverage on the cost of equity (or assume the firms have similar leverage) => Beware if comps have very different leverage.

Comparables: Pros and Cons

Pros:

- Incorporates a lot of information from other valuations in a simple way.
- Embodies market consensus about (comp's) discount rate and growth rate.
- Free-ride on market's information.
- Can provide discipline in valuation process by ensuring that your valuation is in line with other valuations.

Cons:

- Implicitly assumes that comps are alike in growth rates, cost of capital, and business composition. Hard to find true comps.
- Hard time incorporating firm specific information. Particularly problematic if operating changes are going to be implemented.
- Accounting differences, particularly with earnings and equity-based measures. Multiples of FCF and EBITDA preferable for this reason.
- Book values can vary across firms depending on age of PPE.
- If everyone uses comps, who actually does fundamental analysis?

Wrap-up of Valuation

Valuation

Valuation tools:

- Free cash flows
- Cost of capital: WACC and APV
- Real options

Valuing companies

- DCF analysis:
  - → Forecast horizon and terminal values
  - → EVA: When is growth good?
- Comparables, Multiples.

Estimating the FCF

- Free cash flows (FCF) are the ***expected*** after-tax cash flows that the firm would generate if it were 100% equity financed.

  FCF = EBIT*(1-t) + Depreciation - CAPX - ΔNWC

  FCF = EBITD*(1-t) + t * Depreciation - CAPX - ΔNWC

  FCF = EBIT*(1-t) - ΔNA

Recall:

- NWC = Current assets – Current liabilities
- NA = Assets – Current liabilities.

Some Things to Keep In Mind:

- Formulas need to be adapted to particular situations:
  → Need to understand the economics (e.g. Southland's asset sales).

- Use ***all incremental*** cash flows:
  → Ignore sunk costs, count opportunity costs, avoid "accounting illusions"…

- Don't forget FCF at the end of the project's life:
  → If liquidated: SV*(1-t) + t * PPE, recoup NWC.
  → If not liquidated: Terminal values.

- FCF ignores the tax shield provided by the firm's debt.
- We deal with it separately in APV or WACC. Do not include the effects of financing at this stage: <u>You would count them twice!</u>

APV – Adjusted Present Value

- **Step 1: Value if 100% equity, i.e. use k_A to discount the project's FCF**

$$k_A = r_f + \beta_A \cdot \text{Market Risk Premium}$$

- **Step 2: Add PV(Tax Shield)**
  - → Count only tax savings actually attributable to the project.
  - → Use the marginal (as opposed to the average) tax rate.
  - → Use expected (as opposed to maximal) interest payments.

- Caveat: For high D/V, should count expected costs of financial distress.

Weighted Average Cost of Capital (WACC)

- Approach: Adjust the discount rate to account for the tax shield.

$$WACC = \frac{D}{D+E} k_D (1-t) + \frac{E}{D+E} k_E$$

- Most widely used DCF analysis method.
- The aim is to avoid 1st order mistakes:
  - → Everything in WACC is project-specific (except for tax rate t).
  - → Firm-wide WACC is OK only if project comparable to the firm
  - → WACC can be used only if D/V is reasonably stable

Embedded Real Options:

Real Options = Managerial flexibility to react to new information.

- Sometimes, much of a project's value is in embedded options.
- Conditions for there to be an option:
  (1) New information will possibly arrive in the future.
  (2) When it arrives, the new information may affect decisions.
- Frequently encountered options: Options to grow, abandon, expand/contract, time, switch (inputs, outputs, processes, etc.)
- Valuation:
  → Black-Scholes
  → Scenario analysis and decision trees

Take-Aways:

- Main merit of DCF analysis: Forces to argue where value comes from ➔ Most important step is a **reasonable** forecast of FCF.
- Sales forecasts: Reasonable given the firm's resources, the industry, and competition? What market share is needed?
- Margin forecasts: Reasonable given potential competition/entry barriers and bargaining position with suppliers and customers?
- CAPX and other investment forecasts: Consistent with the sales and margin forecasts?
- Terminal value: Does it make sense?
- Sensitivity analysis: What variables and assumptions are crucial to the value? Get more information about these levers.

Take-Aways cont.:

- **Valuation by multiples and DCF valuation methods are complements, not substitutes!**
- Comparables and multiples are important but:
  → don't tell you where value comes from;
  → whether comparables are really comparable.
- DCF analysis (+ real options) forces to justify valuation but:
  → only as good as the data input;
  → relies on imperfect models.
- **Go back and forth between the two approaches.**

Conclusion

Financing

- The bulk of the value is created on the LHS by making good investment decisions.
- You can destroy much value by mismanaging your RHS: Financial policy should be supporting your business strategy.
- You cannot make sound financial decisions without knowing the implications for the business.
- Avoid one-size-fit-all approaches.
- Finance is too important to leave it to finance people.

Valuation

- Making sound business decisions requires valuing them.
- This involves mostly knowing the business (to make appropriate cash-flow forecasts and scenario analyses)
- But also some finance:
  → What discount rate?
  → Valuation exercises help to identify the key value drivers and often inform the business strategy.
- Avoid one-size-fit-all approaches.
- Business is too important to leave it to business people.