

Lectures 11 & 12: Firm Valuation

Outline

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- 3. Method 3: Multiples (Statistical Model)
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0. Motivation

- 1. What's the Question?*
- 2. Who cares?*
- 3. Why don't we already know the answer?*

1. What's the Question?

So far, we've analyzed individual components of a firm's investment and financing strategies.

Now we want to put everything together and ask: how do we estimate the value of an entire company?

0. Motivation

1. What's the Question?

2. Who cares?

3. Why don't we already know the answer?

2. Who cares?

Managers, investors, intermediaries such as investment bankers, equity analysts, etc., all want to have a pulse on corporate valuations.

0. Motivation

1. What's the Question?

2. Who cares?

3. Why don't we already know the answer?

3. Why don't we already know the answer?

Our first approach to answering this question is to use our
INTUITION

Many people use intuition when valuing a business. For example, suppose a proprietor wants to sell the family business; often times they just come up with a number that “feels” right.

1. Valuation using APV: Adjusted Present Value

- The method of writing the PV of a levered project as the sum of the PV of the unlevered project and the PV of “financing side effects” is known as “Adjusted Present Value” (APV) method.
- Besides tax shields we can also include other “financing side effects” such as issuance costs, loan subsidies and (if we can measure them) expected costs of financial distress.

$$\text{Value of levered project} = \text{Value of unlevered project} + \text{PV tax shields}$$

- Using the APV formula we can compute the NPV of a levered project (with constant leverage ratios) as follows:

$$\text{NPV}_{\text{levered}} = \underbrace{\sum_{t=0}^{\infty} \frac{C_t}{(1+r_A)^t}}_{\text{"Base-case NPV"}} + \underbrace{\sum_{t=1}^{\infty} \frac{Tr_D D}{(1+r_A)^t}}_{\text{PV tax shields}},$$

where C_t denotes the *unlevered* project cash flows, T is the corporate tax rate, and D is the (incremental) amount of debt raised because the project is undertaken.

Note that if the firm does not target a constant leverage ratio, you must discount the tax shields by the cost of debt: r_d

2. Weighted Average Cost of Capital (WACC) Method

- The “Weighted Average Cost of Capital” (WACC) method incorporates the tax benefits of debt by discounting the unlevered cash flows at a rate called r_{WACC} .
- Since the tax benefits of debt are fully incorporated in the discount rate there is no need to add any additional terms.
- A key assumption when using this formula is that firms will maintain a constant D/V (or D/E) ratio over time.

Specifically, using the WACC method, we can compute the value of a firm as follows:

$$V_{\text{levered}} = \sum_{t=0}^{\infty} \frac{C_t}{(1 + r_{WACC})^t},$$

where

$$r_{WACC} = \frac{E}{E + D} r_E + \frac{D}{E + D} r_D (1 - T)$$

is the weighted average cost of capital (or “WACC”).

You can show that the WACC method is a special case of APV, when the leverage ratio is assumed to be constant.

- Example 11-1: ABC Corporation, which specializes in the furniture business, is considering an expansion. ABC maintains a constant debt-to-value ratio of 40%. The firm's equity beta is 0.75 and its debt beta is zero. The expansion costs \$1 million today and generates unlevered after-tax cash flows of \$300,000 per year in perpetuity. The risk of the expansion project is the same as that of the firm's existing business. Also, ABC intends to continue with the same debt-to-value ratio after the expansion. The risk-free rate is 5%, the market risk premium is 10%, and the corporate tax rate is 25%.

Should ABC undertake the expansion? Value this firm using the APV and WACC methods.

- Example 11-2 (Mergers and Acquisitions): You are considering acquiring a firm that produces candy. The project costs \$1,000 today and generates expected unlevered after-tax cash flows of \$600 one year from now and \$700 two years from now. You are planning to maintain a constant (optimal) debt-to-value ratio of 30%. At this ratio your cost of debt is 8%. The corporate tax rate is 35%.

The Tucker Corporation, which also specializes in the production of candy, maintains a constant debt-to-value ratio of 20%. The firm's cost of equity is 13% and its cost of debt is 8%.

Should you undertake the project?

- Example 11-3a (Private Equity): The Singer Corporation has a debt-to-value ratio of 10%. The firm's revenues are \$500,000 per year forever and its operating costs are \$360,000 per year forever. The firm's cost of debt is 10% and its cost of equity is 21%. The firm has 100,000 shares outstanding. The corporate tax rate is 34%.

What is the firm's value? Its stock price?

- Example 11-3b: You are a partner at CCR, a well-known private equity firm that specializes in leveraged buyouts. You believe that Singer is highly underleveraged. Precisely, you believe that Singer's optimal debt-to-value ratio is 25%. The firm's cost of debt at this debt-to-value ratio is 12%. You are considering buying all of Singer's shares and increasing the firm's leverage until it has reached its optimal capital structure.

What is the maximum premium you are willing to pay for Singer's shares?

3. Valuation using Multiples

A common method of valuing companies is to use a statistical model:

1. Find other companies that are similar to your firm
2. Compute statistics that summarize the price/value of these other companies (such as a P/E multiple)
3. Apply the multiple to your firm

What are the pros / cons of valuation using multiples?

Examples of Commonly Used Multiples

- ▶ Price-based Multiples:
 - Price/Earnings (P/E), ~~P/EBITDA~~, P/FCF, etc.
- ▶ Value-based Multiples:
 - Enterprise Value/EBITDA, EV/Sales, etc.
- ▶ Book-based Multiples:
 - EV/Book-value of assets, MV of Equity / BV of Equity, etc.
- ▶ For firms with no earnings or limited asset base (e.g. hi-tech):
 - P/Patents, P/Subscribers, ~~P/PhDs!~~
- ▶ For transactions (M&As, takeovers, etc.):
 - Use comparables of similar transactions (e.g. banking deals).
- ▶ Multiples based on share price ignore the effect of leverage.
 - Be careful if comparable firms have very different capital structures.

Example 5.4: Valuing Apple's Stock

Mar-2008 data for Apple Inc.					
	<u>Apple</u>	<u>Dell</u>	<u>HP</u>	<u>MSFT</u>	<u>Industry</u>
Mkt. Cap.(bi)	109.50	43.77	124.47	263.67	44.69
Price	??	20.04	48.62	28.32	-
EPS	4.56	1.31	2.93	1.76	1.33
P/E					26.70

Example 5.4: Valuing Apple's Stock (cont'd)

- What is the right set of comparables?
- What could explain the *actual* price of Apple stock?

4. Valuation in Practice

Thus far, we have focused on economic models to answer questions facing companies. We have studied how to:

- 1) Estimate free cash flow projections for a project or firm (think of a firm as a collection of projects)
- 2) Estimate the weighted average cost of capital for a project or firm
- 3) Evaluate the optimal capital structure for a company

The three steps above (and often times just the first two steps), are sufficient for estimating valuations for stand-alone companies, divestitures, and even companies involved in mergers and acquisitions.

In practice, there are various steps that analysts take to evaluate the quality of their projections:

- 1) Compare valuations across various methods (multiples, vs. DCF, vs. historical / comparable valuations)
- 2) Compute statistical ratios based on items within the cash flow projection and compare with historical data / comparable projections (eg. operating margins, return on capital, etc.)
- 3) Evaluate sensitivity of outputs to variation in inputs