Valuing Companies

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
Two Complementary Valuation Methods:

1) Discounted Cash Flow Analysis
   → WACC
   → APV

2) Comparables
   → Cash flow based Value Multiples
   → Cash flow based Price Multiples
   → Asset-based Multiples

Discounted Cash Flow Analysis

• **WACC method:**
  → Forecast expected FCF
  → Estimate WACC
  → Compute PV

• **APV method:**
  → Forecast expected FCF
  → Estimate $k_A$
  → Compute PV
  → Add PV(Tax Shield)
Terminal Values

- In valuing long-lived projects or ongoing businesses, we cannot forecast every year of cash flow forever.

- Forecast FCF until it is reasonable to think that the project or company is in “steady state.”

- Typically, assume:
  - either the company is liquidated;
  - or FCF is a growing, flat, or declining perpetuity;

- Note: The forecast horizon will depend on firm and industry.

Terminal Value in Liquidation:

1) Salvage value (SV):
   - CF that the firm receives from liquidating its assets
     \[ SV = \text{Liquidation price} - \text{Liquidation costs} \]
   - The firm is taxed on (SV – PPE) so that overall it gets
     \[ SV^*(1- t) + t*PPE \]

2) Net Working Capital
   - Recouped NWC at project end (i.e., last \( \Delta \text{NWC} = \text{last NWC} \)
Remarks on Liquidation Values:

- In principle, you would like NWC’s actual value, not book value.
- These might differ for several reasons:
  - cannot recoup the A/R fully
  - Inventory may sell above or below book value
  - etc.
- Note that differences between actual and book value of NWC will have tax implications.
- Liquidation value tends to underestimate TV unless liquidation is likely. Useful as a lower bound.

Terminal Value as Perpetuity:

- **No-growth perpetuity**: PV in year t of a flat perpetuity starting in year (t+1) with first payment C, and discount rate k is \( C/k \).
  
  \[ TV = \frac{FCF_{T+1}}{k} \]

- For a no-growth firm, we often assume (for simplicity)

\[
FCF = EBIT(1-t) + \text{Depreciation} - \text{CAPX} - \Delta\text{NWC}
\]

\[
TV = \frac{(1-t)EBIT_{T+1}}{k}
\]
Terminal Value as Growing Perpetuity:

- PV in year t of a perpetuity starting in year (t + 1) with first payment C, growth rate g, and discount rate k is \( C/(k - g) \)

\[ TV = \frac{FCF_{t+1}}{k - g} \]

- For a growing perpetuity, we often assume (for simplicity)

\[ FCF = EBIT(1-t) + \text{Depreciation} - \text{CAPX} - \Delta\text{NWC} \]

\[ -\Delta\text{NA} = -g*\text{NA}_{\text{prior year}} \]

\[ TV = \frac{[(1-t)EBIT_{t+1} - g*\text{NA}_{t}]}{(k - g)} \]

Remarks

- Growing perpetuity – assumptions:
  - Net assets grow at the same rate as profits.
  - \( \Delta\text{NA} \) is a good measure of replacement costs.

- Don’t forget to discount TV further to get PVTV.

- In WACC method, \( k = \text{WACC} \).

- In APV method, \( k = k_a \) for FCF and appropriate rate for TS.
When is Growth Valuable?

Need to compare the terminal value with growth to the value without growth:

\[
TV \text{ (with growth)} > TV \text{ (w/o growth)}
\]

\[
\frac{(1+g) \cdot \text{EBIT}(1-t) - g \cdot NA}{k-g} > \frac{\text{EBIT}(1-t)}{k}
\]

\[
\text{EBIT}^*(1-t) - k^*NA > 0
\]

Economic Value Added (EVA):

\[
\text{EVA} = \text{EBIT}^*(1-t) - k^*NA
\]

**Intuition:** Growth is good when the cost of increasing NA is more than compensated by the capitalized increase in \(\text{EBIT}^*(1-t)\).
EVA: Some remarks

- EVA is a snapshot measure, disregards future cash flow implications.

Use EVA as...
- ... a simple measure to determine whether the business is generating value and whether growth is enhancing value.
- ... as a way of setting goals to enhance value.

Beware of EVA for...
- ... young companies.
- ... companies in rapidly changing business environments.
- ... companies where book values are not accurate measures of replacement costs.

DCF Analysis: Pros and Cons

Strengths
- CF comes from specific forecasts and assumptions.
- Can see impact of changes in strategies.
- Valuation tied to underlying fundamentals.

Weaknesses
- CF only as good as your forecasts/assumptions.
- Might “forget something”.
- Need to forecast managerial behavior (unless you’re in control).
- Need to estimate the discount rate using a theory (e.g. CAPM) that may be incorrect or imprecise in this particular case.
Valuation by Multiples:

- Assess the firm’s value based on that of publicly traded comparables.

- **Cash-flow-based Value multiples:**
  \[ \text{MV of firm/Earnings}, \quad \text{MV of firm /EBITDA}, \quad \text{MV of firm /FCF} \]

- **Cash-flow-based Price multiples:**
  \[ \text{Price/Earnings (P/E)}, \quad \text{Price/EBITDA}, \quad \text{Price/FCF} \]

- **Asset-based multiples:**
  \[ \text{MV of firm/BV of assets}, \quad \text{MV of equity/BV of equity} \]

Procedure

- **Hope:** Firms in the same business should have similar multiples (e.g. P/E).

- **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.

Motivation for Multiples?

- If the firm’s actual FCF are a perpetuity:
  MV firm = FCF/(WACC-g) => MV firm/FCF = 1/(WACC-g)

  ⇒ Comps will have a similar MV firm/FCF provided:
     → their FCFs are also a perpetuity
     → they have the same WACC (requires similar D/(D+E))
     → they are growing at a similar rate

- Since these are rough approximations (at best), you may want to check if using different multiples give you similar answers. If not, find out why not.
Comparables: Pros and Cons

Pros:
- Incorporates a lot of information from other valuations in a simple way.
- Embodies market consensus about 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 all companies 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?
Example

• You are considering the acquisition of XYZ Enterprises. XYZ’s balance sheet looks like this as of today (year 0).

<table>
<thead>
<tr>
<th></th>
<th>Assets</th>
<th>Liabilities</th>
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<tbody>
<tr>
<td>Current assets</td>
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<td>Current liabilities</td>
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<td>Plant</td>
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<td>Debt</td>
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Projections:

<table>
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<th>Sales</th>
<th>EBIT</th>
<th>NWC</th>
<th>Depreciation</th>
<th>CAPX</th>
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Example (cont.)

• Assuming tax rate $t = 34\%$ and WACC = 13%, what is the value of XYZ’s stock under the following assumptions past year 5:

1) XYZ is liquidated after year 5 (assuming zero salvage value).

2) Sales growth slows to $g = 5\%$ and EBIT/Sales remains about 10%.

3) Sales stop growing ($g = 0$), and EBIT/Sales remains around 10%.

4) Sales growth slows to $g = 5\%$, and EBIT/Sales drop to 5%.

5) Sales stop growing ($g = 0$), and EBIT/Sales drop to 5%.
Example (cont.)

Start by estimating FCF over 5 years:

- \( \text{NWC(year 0)} = \text{Current assets - current liabs} = 50-20=30 \)

\[
\text{FCF} = \text{EBIT}(1 - t) + \text{Dep} - \text{CAPX} - \Delta \text{NWC}
\]

<table>
<thead>
<tr>
<th>Year</th>
<th>EBIT</th>
<th>EBIT(1-t)</th>
<th>NWC</th>
<th>∆NWC</th>
<th>Depreciation</th>
<th>CAPX</th>
<th>FCF</th>
<th>PV @ 13%</th>
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</tbody>
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Finance Theory II (15.402) – Spring 2003 – Dirk Jenter

Example (cont.)

1) Liquidation value (LV)

\[
t^*\text{PPE(year 5)} + \text{NWC(year5)}
\]

\[
\text{PPE(year 5)} = \text{PPE(year 0)} + \text{all CAPX} - \text{all Dep from year 0 to 5}
\]

\[
\Rightarrow \text{PPE} = 50+(10+10+15+6+20)-(5+5+6+7+8) = 80
\]

\[
\Rightarrow \text{PPE} * t = 80 * 34\% = 27.2
\]

\[
\text{LV} = 27.2 + 48 = 75.2 \quad \Rightarrow \quad \text{PVLV} = 75.2/(1.13)^5 = 40.8
\]

\[
\text{Firm value} = 22.7 + 40.8 = 63.5
\]

\[
\text{Equity value} = \text{Firm value} - \text{MV of Debt} = 63.5 - 30 = 33.5
\]

Finance Theory II (15.402) – Spring 2003 – Dirk Jenter
Example (cont.)

For 2) to 5), we need EBIT (year 6) and NA (year 5) to apply

\[ \text{EBIT(year 6)} = \text{fraction } \alpha \text{ of Sales(year 6)} \]
\[ = \alpha \times (1 + g) \times \text{Sales(year 5)} = \alpha \times (1 + g) \times 293 \]

\[ \text{NA(year 5)} = \text{NA(year 0)} + \text{all CAPX } - \text{all Dep } - \text{all } \Delta \text{NWC from 0 to 5} \]
\[ = (100-20) + (10+10+15+6+20) - (5+5+6+7+8) + (3+4+4+3+4) \]
\[ = 128 \]

\[ \text{TV} = [\alpha \times (1 + g) \times 293 \times (1 - 34\%) - g \times 128] / (13\%-g) \]
and \( PVTV = \text{TV} / (1.13)^5 \)

<table>
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<th>Firm</th>
<th>Equity</th>
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<td>73.4</td>
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<td>5)</td>
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