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
$\rightarrow$ WACC
$\rightarrow$ APV

2) Comparables
$\rightarrow$ Cash flow based Value Multiples
$\rightarrow$ Cash flow based Price Multiples
$\rightarrow$ Asset-based Multiples

Discounted Cash Flow Analysis

- **WACC method:**
  $\rightarrow$ Forecast expected FCF
  $\rightarrow$ Estimate WACC
  $\rightarrow$ Compute PV

- **APV method:**
  $\rightarrow$ Forecast expected FCF
  $\rightarrow$ Estimate k_A
  $\rightarrow$ Compute PV
  $\rightarrow$ 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

$$\textbf{SV = Liquidation price - Liquidation costs}$$

- The firm is taxed on (SV – PPE) so that overall it gets

$$\textbf{SV*(1- t) + t*PPE}$$

2) Net Working Capital
- Recouped NWC at project end (i.e., last ΔNWC = last NWC)

Remarks on Liquidation Values:

- In principle, you would like NWC's actual value, not book value.

- These might differ for several reasons:
    - $\rightarrow$ cannot recoup the A/R fully
    - $\rightarrow$ Inventory may sell above or below book value
    - $\rightarrow$ 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 <u>lower bound</u>.
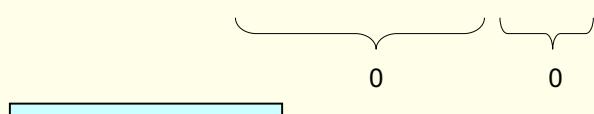

Terminal Value as Perpetuity:

- **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**.

$$\rightarrow \qquad TV = FCF_{T+1} \,/\, k$$

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

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

$$\underbrace{\qquad\qquad\qquad\qquad}_{0} \quad \underbrace{\qquad\quad}_{0}$$

$$\boxed{TV = (1\text{-}t)EBIT_{T+1} \,/\, k}$$

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)**

$\rightarrow \quad$ **TV = FCF$_{T+1}$ / (k – g)**

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

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

$-\Delta$NA = -g*NA $_{prior\ year}$

TV = [(1- t)EBIT$_{T+1}$ – g*NA$_T$] / (k - g)

(1+g)(1-t)EBIT$_T$

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Remarks

- Growing perpetuity – assumptions:

  $\rightarrow$ Net assets grow at the same rate as profits.
  $\rightarrow \Delta$NA is a good measure of replacement costs.

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

- In WACC method, k=WACC.

- IN APV method, k=k$_A$ for FCF and appropriate rate for TS.

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When is Growth Valuable?

Need to compare the terminal value <u>with</u> growth to the value <u>without</u> growth:

TV (with growth) > TV (w/o growth)

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

EBIT*(1 - t) - k*NA > 0

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

$$[(1+g)\cdot EBIT(1-t)-g\cdot NA]\times k > EBIT(1-t)\times(k-g)$$

$$\frac{EBIT(1-t)}{NA} > \frac{k}{1+k} \approx k$$

Economic Value Added (EVA):

EVA = EBIT*(1 - t) - k*NA

Intuition: Growth is good when the cost of increasing NA is more than compensated by the capitalized increase in EBIT*(1 - t).

EVA: Some remarks

- EVA is a snap shot 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:**
  - → 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

- **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).

- **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?

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Example

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

Assets		Liabilities	
Current assets	50	Current liabilities	20
Plant	50	Debt	30
		Net worth	50
Total	100	Total	100

- Projections:

	Year 1	Year 2	Year 3	Year 4	Year 5
Sales	200	217	239	270	293
EBIT	20	22	25	26	30
NWC	33	37	41	44	48
Depreciation	5	5	6	7	8
CAPX	10	10	15	6	20

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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%.

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Example (cont.)

Start by estimating FCF over 5 years:
- NWC(year 0) = Current assets - current liabs = 50-20=30

$$FCF = EBIT(1 - t) + Dep - CAPX - \Delta NWC$$

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
EBIT		20	22	25	26	30
EBIT(1-t)		13.2	14.52	16.5	17.16	19.8
NWC	30	33	37	41	44	48
ΔNWC		3	4	4	3	4
Depreciation		5	5	6	7	8
CAPX		10	10	15	6	20
FCF		5.2	5.52	3.5	15.16	3.8
PV @ 13%	**22.7**					

Example (cont.)

1) Liquidation value (LV)
$$t*PPE(year\ 5) + NWC(year5)$$

PPE(year 5) = PPE(year 0) + all CAPX - all Dep from year 0 to 5
==> PPE = 50+(10+10+15+6+20)-(5+5+6+7+8) = 80
==> PPE * t = 80 * 34% = 27.2

LV = 27.2 + 48 = 75.2   ==> PVLV = 75.2/(1.13)5 = 40.8

Firm value = 22.7 + 40.8 = 63.5
Equity value = Firm value - MV of Debt = 63.5 - 30 = **33.5**

Example (cont.)

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

$$[EBIT(\text{year } 6)(1 - t) - g*NA(\text{year } 5)]/[k - g]$$

EBIT(year 6) = fraction α of Sales(year 6)

$$= \alpha*(1 + g)*\text{Sales(year 5)}= \alpha*(1 + g) *293$$

NA(year 5)= NA(year 0) +all CAPX -all Dep +all ΔNWC from 0 to 5

$$= (100-20) + (10+10+15+6+20) - (5+5+6+7+8)$$
$$+(3+4+4+3+4)$$
$$= 128$$

TV=$[\alpha*(1 +g)*293*(1-34\%) -g*128] /(13\%-g)$ and PVTV= TV/(1.13)^5

Example (cont.)

	α	g	TV	PVTV	Firm	Equity
2)	10%	5%	173.8	94.3	117.0	87.0
3)	10%	0%	148.8	80.7	103.4	73.4
4)	5%	5%	46.9	25.5	48.2	18.2
5)	5%	0%	74.4	40.4	63.1	33.1