Class #4

“Using Accounting Earnings for Valuation”

aka “EBO Valuation” or

“Abnormal Earnings Valuation” or

“Residual Income Valuation”
Where have we been & where are we going?

• Where have we been?
  – Valuation Basics
  – Calculating Cash flows

• Today
  – Overview of Dell Abnormal Earnings Valuation
  – Quickly discuss accounting and real options

• What we still need?
  – Other techniques: Multiples Valuation (Next Class)
  – Forecasting earnings and cashflows
  – Avoid being fooled by financial statements
Discussion of E-Assignment #1: Dell Valuation

- Approach to teaching *Financial Valuation & Analysis*:
  - First, we define the problem we are facing, then knowing the context, we build a set of tools to solve the problem.

- We are starting to see the issues:
  - Must estimate earnings, cashflows, balance sheet items.
  - Must avoid the pitfalls of “misleading” financial reports … managers may want to fool you.
  - Must estimate risk, growth, etc.
  - Yahoo! data and analysts’ estimates are a “crutch” right now.
Aside … What is “Value Added” in Performance Measurement?

• **What is Value Added?**
  – Can we determine if company has invested capital wisely?

• **Starting Point: Market Value Added (MVA)**
  – MVA for All Investors (Debt+Equity)
    • MVA = Market Value (D+E) – Invested Capital (D+E)
  – MVA for Equityholders (just Equity)
    • MVA = Market Value (Equity) – Invested Capital (Equity)

  – Qualifications?
    • Invested Capital is from the past! Market Value is from Today!
What is Value Added in Valuation?

• The “value added methodologies” are used to measure the profits (or losses) generated by a firm for a given level of capital investment & the risk of these investments:
  – Also called residual income or abnormal earnings

• Value Added (for all investors … Debt + Equity):
  = Net Operating Profit after tax – Capital charge
  • \( NOPAT = \text{Net Operating Profit after Tax} \)
  • \( \text{Capital charge} = r_{\text{assets}} \times \text{Value of Assets at start of year} \)

• Residual Income for Equityholders:
  = Net Income – Capital charge
  • \( \text{Capital charge} = r_{\text{equity}} \times \text{Value of Equity at start of year} \)
Why “Abnormal Earnings” or “Residual Income” Valuation?

• REMINDER! Valuation ultimately boils down to DCF (or discounted dividends).

• **Big Problem:** Estimating future FCF’s or dividends.
  - Does there exist a *meaningful* way to map accounting numbers into equity value given that cash is real?
  - Traditional answer: NO, given that …
    • Accrual-based accounting numbers do not take into account the timing of cash flows.
    • Earnings do not perfectly reflect investments in the same way as FCF does.
    • *(Most of all)* Accounting numbers can be manipulated.

• **BUT:** DCF is based on forecasting accruals (sales, profit margins, earnings) and then unraveling them…. 
Starting Point for “AE” Valuation:

**Intuition:**

- The value of the firm (or equity in the firm) can be the sum of three components:

  1) **Original Invested Capital**
     - What is the starting value of funds originally contributed by investors (equityholders).

  2) **Normal rate of return on Invested Capital**
     - Basically determined by cost of capital (“r”).

  3) **Abnormal return on Invested Capital**
     - Abnormal earnings (residual income) above normal rate of return.
The Model

• Use this idea to express current equity value of the firm as a function of book value of the firms and abnormal earnings:

\[
\text{Equity Value}_0 = BV_0 + \sum_{t=1}^{\infty} \frac{AE_t}{(1+r)^t}
\]

where: 
- \( BV_t \) = Book value of equity at beginning of year \( t \)
- \( r \) = Cost of equity capital
- \( AE_t \) = Expected value of abnormal earnings in year \( t \)
  = Projected earnings in yr \( t \) - \( r \times BV \) of equity at beginning of year \( t \)
Where does model come from?

- Basically a rearrangement of the discounted dividend or FCF valuation models.
- Combines “current value” on the balance sheet with the present value of future “abnormal earnings”.
- In theory, should give the same answer as discounted dividend and DCF (or free cash flow) valuation models.
- Uses accounting numbers (which are easy to observe) and future projections of earnings (which are easier to project … analysts).
Overview of Steps of Abnormal Earnings Valuation

Step 1: Forecast earnings in each year $t=1,...,T$ in the forecast horizon.

Step 2: Estimate “r”, the cost of equity capital.

Example using CAPM:

$$r = R_f + \beta^* [E(R_M) - R_f]$$  where

$R_f$ = “Riskless” return

$\beta$ = Beta on common stock

$E(R_M) - R_f$ = Expected risk premium on market portfolio
Steps - Continued

**Step 3:** Estimate expected abnormal earnings in each yr $t = 1, \ldots, T$ in forecast horizon:

$$AE_t = E_t - (r \times BV_{t-1})$$

**Step 4:** Use “r” to estimate the PV of abnormal earnings during the forecast horizon:

$$AE_1/(1+r)^1 + AE_2/(1+r)^2 + \ldots + AE_T/(1+r)^T$$

**Step 5:** Estimate the PV of expected abnormal earnings beyond the forecast horizon:

- Use perpetuity
- Use growing perpetuity
Steps – Terminal Values

- **PERPETUITY METHOD**
  - Estimate AE in year $T+1$
  - Assume AE constant beyond year $T+1$

  $$\text{PV of AE beyond yr } T = \left[ \frac{\text{AE}_{T+1}}{r} \right] / (1+r)^T$$

- **GROWING PERPETUITY METHOD**
  - Estimate AE in year $T+1$
  - Assume AE grow beyond year $T+1$ forever at rate $g$/year

  $$\text{PV of AE beyond yr } T = \left[ \frac{\text{AE}_{T+1}}{(r - g)} \right] / (1+r)^T$$
Steps – Final Step

**Step 6:** Computer equity value by summing together the parts:

Equity Value = BV of equity at beginning of yr 1  
+ PV of AE during forecast horizon (Step 4)  
+ PV of AE beyond forecast horizon (Step 5)
EBO Valuation using Dell Computer Example.

• Inputs:
  – $BV_0 = $1.80 (Book value of equity per share at the end of the 3rd quarter of fiscal year. From latest financials on Yahoo! http://biz.yahoo.com/z/a/d/dell.html
  • 2003 year end is NOW!
  • Therefore, small adjustment to $BV_0
  • Use estimate of current (4th quarter earnings = $0.23)
  • Therefore, updated $BV_0 = BV_0 + EPS_{4thQ} = 1.80 + 0.23 = $2.03
  – Take Yahoo! earnings forecasts for 2004: $E_1 = $0.99
EBO Valuation using Dell Computer Example.

• Inputs:
  – % 5 year growth in EPS is projected to be: 15%
    • $E_2 = E_1 \times (1+g) = \$0.99 \times (1.15) = \$1.14$
    • $E_3 = E_2 \times (1+g) = \$1.14 \times (1.15) = \$1.31$
    • $E_4 = E_3 \times (1+g) = \$1.31 \times (1.15) = \$1.51$
    • $E_5 = E_4 \times (1+g) = \$1.51 \times (1.15) = \$1.73$
  – Cost of Capital (from CAPM)
    \[ R = R_f + \beta \times (R_m - R_f) \]
    \[ = 5\% + 1.79 \times (8\%) = 19.3\% \]
EBO Valuation using Dell Computer Example.

• Calculations:

\[ BV_1 = BV_0 + (E_1 - DIV_1) = 2.03 + (0.99 - 0) = $3.02 \]
\[ BV_2 = BV_1 + (E_2 - DIV_2) = 3.02 + (1.14 - 0) = $4.16 \]

\[ AE_1 = E_1 - r \cdot BV_0 = 0.99 - (0.193) \cdot 2.03 = $0.60 \]
\[ AE_2 = E_2 - r \cdot BV_1 = 1.14 - (0.193) \cdot 3.02 = $0.55 \]

\[ AE_3 = ? \]
\[ AE_4 = ? \]
\[ AE_5 = ? \]
EBO Valuation using Dell Computer Example.

• Final Calculation:

\[ P = BV_0 + \frac{AE_1}{(1+r)} + \frac{AE_2}{(1+r)^2} + PV \text{ of future AE?} \]

In this case, let’s assume AE → 0 in year 9:

\[ P = 2.03 + \frac{0.60}{(1+r)} + \frac{0.56}{(1+r)^2} + \frac{0.51}{(1+r)^3} + \frac{0.45}{(1+r)^4} + \frac{0.38}{(1+r)^5} + \ldots \]
Extreme Earnings Reverts to "Normal Rate of Return"
How Will Abnormal Earnings Evolve in the Future?

• By their very definition, AE are hard to sustain:
  – Positive abnormal earnings – Competitors enter
  – Negative abnormal earnings – Takeover, management fired, restructuring, etc.

• Potential Problems:
  – What if Book Value of Equity (BV) is incorrectly measured?
  – Why might BV be too low?
Final Calculations for DELL

Predicted Price of Dell based on abnormal earnings valuation is:

\[ P = \underline{\phantom{0}} \]

What is current price of DELL? Around $23.00

Is our assumption about future AE valid? Why?
Comparison with DCF – Equivalent?

• Simpler than DCF:
  – Forecast accounting variables directly
  – Cost of capital calculation is easier (than WACC)
  – Terminal value is less important than in DCF-context … Easier to implementation assumption about future earnings (or abnormal earnings). Compare this with your DCF analysis for DELL!
  – Terminal value represents only stream of abnormal earnings beyond the forecast horizon
Problems with Residual Income Valuation

• If the balance sheet does not recognize the current value of assets (or fails to recognize them at all), then what does this imply for abnormal earnings?
  – Book value fails to account for certain assets that do generate cashflows!
  – $AE_t = E_t - r \times BV_{t-1}$
  – Implications for future AE?
  – Intangibles: patents, R&D, trademarks, brandnames, etc.
Intangibles

• If the balance sheet does not recognize intangible assets, then what does this imply for abnormal earnings?
  – Measured “abnormal earnings” may persist forever.

• Intangibles:
  – Patents, trademarks, brandnames, etc.
  – Account for “investments” in a factory?
  – Account for “investments” R&D, advertising, employee training?
Real Options

• Most valuation approaches (DCF, AE, etc) fail to account for real options:
  – Option to abandon poorly-performing businesses
  – Option to expand the “winners”
  – Option to redeploy or adapt assets to superior use
  – Option to wait before investing (gold-mine example)
Real Options: Practical Issues

• How do you take into account real options?
  – Practical approach #1: Consider P/E ratio or M/B ratio for valuation. If firm is earning losses then which should you use?
  – Berger, Ofek and Swary (JFE 1995)
    • Consider the type of assets on the balance sheet – tangible versus intangible (cash versus brand-name)
    • What type of assets are valuable if firm “crashes“?
    • The “Worst Case Scenario” valuation of assets on balance sheet …. Explains why balance sheets often have “conservative” valuation of assets (Historical cost).
Where Next?

• Next Class – “Comparative Analysis”
  – Priced Based Financial Ratios
  – Accounting Based Ratios

• Skim Section F of Course Reader (“Introduction to Profitability and Risk Analysis”).

• Assignment #1 is due in class on Tuesday, February 25, 2003.