# Financial Statement Analysis

## MSc. in Financial Analysis for Executives


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# Part III

## Valuation with Financial Statements

# How Financial Statements are Used in Valuation

# Simple (and Cheap) Approaches to Valuation

- Fundamental analysis is detailed and costly.
- Simple approaches avoid forecasting and minimize information analysis. But they lose precision.
- Simple methods:
  - ✓Method of Comparables
  - ✓Screening on Multiples
  - ✓Asset-Based Valuation

# The Method of Comparables

1. Identify comparable firms that have similar operations to the firm whose value is in question (the "target").

2. Identify measures for the comparable firms in their financial statements – earnings, book value, sales, cash flow – and calculate multiples of those measures at which the firms trade.

3. Apply these multiples to the corresponding measures for the target to get that firm's value.

# The Method of Comparables: Dell, Gateway and Hewlett Packard, 2002

| | Sales | Earnings | Book Value | Market Value | P/S | P/E | P/B |
|---|---|---|---|---|---|---|---|
| Hewlett Packard Co. | $45,226 | $624 | $13,953 | $32,963 | 0.73 | 52.8 | 2.4 |
| Gateway 2000 Inc. | 6,080 | (1,290) | 1,565 | 1,944 | 0.32 | - | 1.2 |
| Dell Computer Corp. | 31,168 | 1,246 | 4,694 | ? | ? | ? | ? |

| | Average Multiple for Comparables | Dell's Number | Dell's Valuation |
|---|---|---|---|
| Sales | 0.53 | $31,168 | $16,519 |
| Earnings | 52.8 | 1,246 | 65,789 |
| Book Value | 1.8 | 4,694 | 8,449 |
| Average of Valuations | | | 30,252 |

# How Cheap is this Method?

## Conceptual problems:

- Circular reasoning: Price is ascertained from price (of the comps)
- Violates the tenet: “When calculating value to challenge price, don’t let price enter the calculation”
- If the market is efficient for the comparable companies....Why is it not for the target company ?

## Implementation problems:

- Finding the comparables that match precisely
- Different accounting methods for comps and target
- Different prices from different multiples
- What about negative denominators?

## Applications:

- IPOs; firms that are not traded (to approximate price, not value)

# Unlevered (or Enterprise) Multiples (that are Unaffected by the Financing of Operations)

$$\text{Unlevered Price/Sales Ratio} = \frac{\text{Market Value of Equity} + \text{Net Debt}}{\text{Sales}}$$

$$\text{Unlevered Price/ebit} = \frac{\text{Market Value of Equity} + \text{Net Debt}}{\text{ebit}}$$

$$\text{Unlevered Price/ebitda} = \frac{\text{Market Value of Equity} + \text{Net Debt}}{\text{ebitda}}$$

$$\text{Enterprise P/B} = \frac{\text{Market Value of Equity} + \text{Net Debt}}{\text{Book Value of Equity} + \text{Net Debt}}$$

# Variations of the P/E Ratio

$$\text{Trailing P/E} = \frac{\text{Price per share}}{\text{Last annual Eps}}$$

$$\text{Rolling P/E} = \frac{\text{Price per share}}{\text{Sum of Eps for most recent four quarters}}$$

$$\text{Forward P/E} = \frac{\text{Price per share}}{\text{Forecast of next year's Eps}}$$

# Dividend–Adjusted P/E

$$\text{Dividend - Adjusted P/E} = \frac{\text{Price per share} + \text{Annual Dps}}{\text{Eps}}$$

Rationale : Dividend affects prices but not earnings

# Typical Values for Common Multiples

| | Multiple | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Percentile | P/B | Enterprise P/B | Trailing P/E | Forward P/E | P/S | Unlevered P/S | P/CFO | Unlevered P/ebitda | Unlevered P/ebit |
| 95 | 7.9 | 12.7 | Negative earnings | 49.2 | 8.9 | 8.1 | Negative cash flow | 30.1 | Negative ebit |
| 75 | 2.9 | 2.7 | 23.5 | 19.1 | 1.7 | 2.0 | 18.8 | 10.6 | 15.3 |
| 50 | 1.7 | 1.5 | 15.2 | 13.1 | 0.8 | 0.9 | 9.9 | 7.0 | 9.9 |
| 25 | 1.0 | 1.0 | 10.3 | 9.2 | 0.3 | 0.5 | 5.6 | 4.8 | 6.6 |
| 5 | 0.5 | 0.6 | 5.9 | 5.6 | 0.1 | 0.2 | 2.3 | 2.5 | 3.3 |

# Screening Analysis

- Technical screens: identify positions based on trading indicators
  - ✓ Price screens
  - ✓ Small stock screens
  - ✓ Neglected stocks screens
  - ✓ Seasonal screens
  - ✓ Momentum screens
  - ✓ Insider trading screens
- Fundamental screens: identify positions based on fundamental indicators of the firm's operations relative to price
  - ✓ Price/Earnings (P/E) ratios
  - ✓ Market/Book Value (P/B) ratios
  - ✓ Price/Cash Flow (P/C) ratios
  - ✓ Price/Dividend (P/d) ratios
- Any combination of these methods is possible

# How Multiple Screening Works

1. Identify a multiple on which to screen stocks.
2. Rank stocks on that multiple, from highest to lowest.
3. Buy stocks with the lowest multiples and (short) sell stocks with the highest multiples.

# Fundamental Screening: Return to Price-to-Book

| Price/Book Group | Mean Monthly Return (%) | Mean Beta |
|---|---|---|
| 1 (High) | 0.49 | 1.35 |
| 2 | 0.87 | 1.32 |
| 3 | 0.97 | 1.30 |
| 4 | 1.04 | 1.28 |
| 5 | 1.17 | 1.27 |
| 6 | 1.30 | 1.27 |
| 7 | 1.44 | 1.27 |
| 8 | 1.50 | 1.27 |
| 9 | 1.59 | 1.29 |
| 10 (Low) | 1.88 | 1.34 |

Source: Fama and French (1992)

# Technical Screening: Returns to Size

| Size Group | Mean Beta | Mean Monthly Return (%) |
|---|---|---|
| 1 (Large) | 0.93 | 0.89 |
| 2 | 1.02 | 0.95 |
| 3 | 1.08 | 1.10 |
| 4 | 1.16 | 1.07 |
| 5 | 1.22 | 1.17 |
| 6 | 1.24 | 1.29 |
| 7 | 1.33 | 1.25 |
| 8 | 1.34 | 1.24 |
| 9 | 1.39 | 1.29 |
| 10 (Small) | 1.44 | 1.52 |

Source: Fama and French (1992)

**Average Monthly Returns and Estimated Betas from July 1963 to December 1990 for Ten Size Groups**

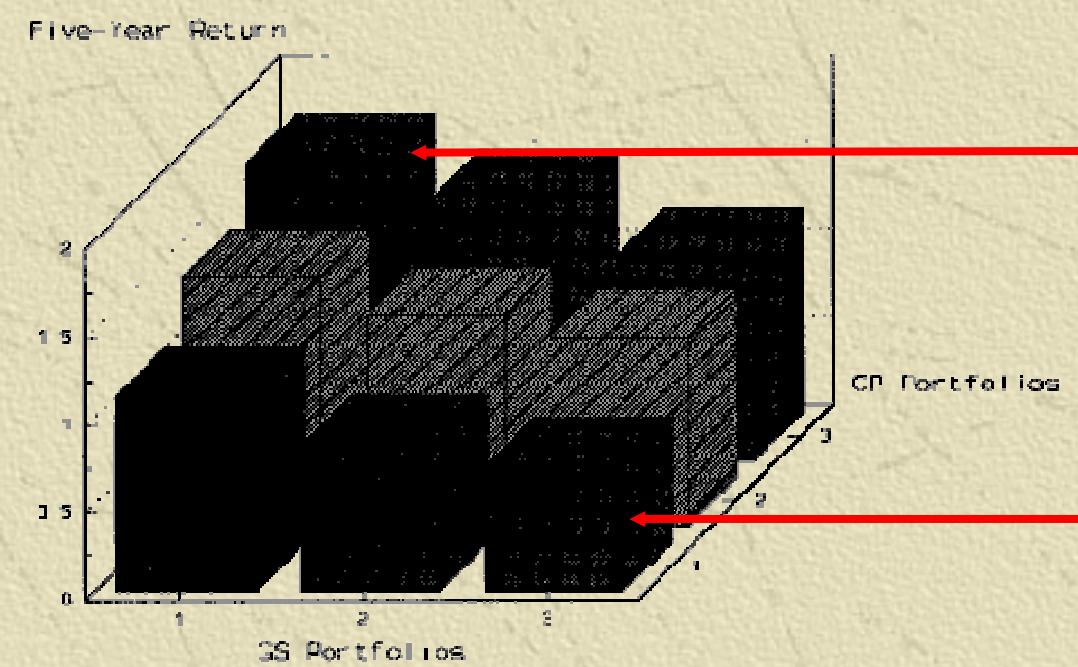
# Returns to Beta: Is Beta Dead?

| Beta Group | Mean Monthly Return (%) | Mean Beta |
|---|---|---|
| 1 (High) | 1.26 | 1.68 |
| 2 | 1.33 | 1.52 |
| 3 | 1.23 | 1.41 |
| 4 | 1.23 | 1.32 |
| 5 | 1.30 | 1.26 |
| 6 | 1.30 | 1.19 |
| 7 | 1.31 | 1.13 |
| 8 | 1.26 | 1.04 |
| 9 | 1.32 | 0.92 |
| 10 (Low) | 1.20 | 0.80 |

Source: Fama and French (1992)

**Average Monthly Returns and Estimated Betas from July 1963 to December 1990 for Ten Beta Groups**

# Returns to two fundamental screens




Value

Glamour

**Figure 1. Compounded 5-year return for portfolios formed on the basis of *C / P* and *GS*.** At the end of each April between 1968 and 1989, 9 groups of stocks are formed. The stocks are independently sorted in ascending order into 3 groups (1) bottom 30 percent, (2) middle 40 percent, and (3) top 30 percent) based on each of two variables: cash-flow-to-price (*C/P*) and growth-in-sales (*GS*). Returns presented are compounded 5-year postformation returns assuming annual rebalancing for these 9 portfolios.

Source: Lakonishok, Shleifer, & Vishny, "Contrarian Investment, Extrapolation, and Risk," *Journal of Finance*, Vol. 49, No. 5. (Dec., 1994), p 1554.

# Year by Year Returns: Value Minus Glamour

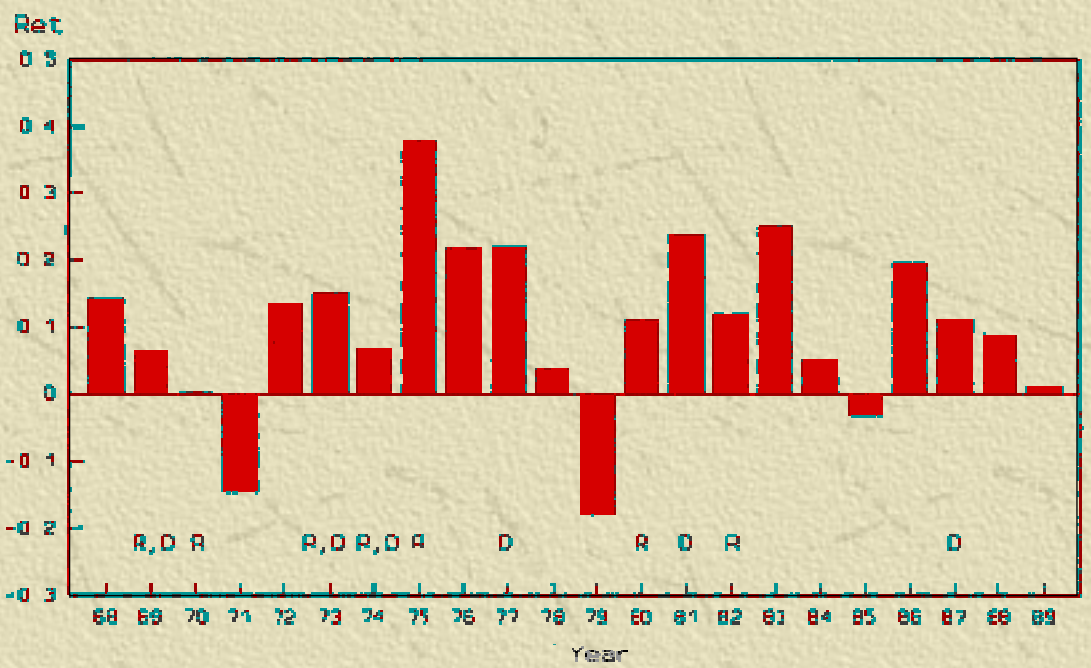



**Figure 2. Year-by-year returns: Value minus glamour.** At the end of each April between 1968 and 1989, 9 groups of stocks are formed. The stocks are independently sorted in ascending order into 3 groups ((1) bottom 30 percent, (2) middle 40 percent, and (3) top 30 percent) based on each of two variables: cash-flow-to-price ($C/P$) and growth-in-sales ($GS$). The value portfolio consists of those stocks in the highest $C/P$ groups and the lowest $GS$ group. The glamour portfolio consists of those stocks in the lowest $C/P$ group and the highest $GS$ group. The numbers presented are annual buy-and-hold returns for the value portfolio minus returns for the glamour portfolio. Annual buy-and-hold returns are calculated beginning at the end of April for the given year. $R$ indicates NBER recession years, and $D$ indicates years in which the CRSP equally weighted index declined in nominal terms.

Source: Lakonishok, Shleifer, & Vishny, "Contrarian Investment, Extrapolation, and Risk," *Journal of Finance*, Vol. 49, No. 5. (Dec., 1994), p 1566.

# P/B and P/V Ratios: The Dow Stocks 1979-96

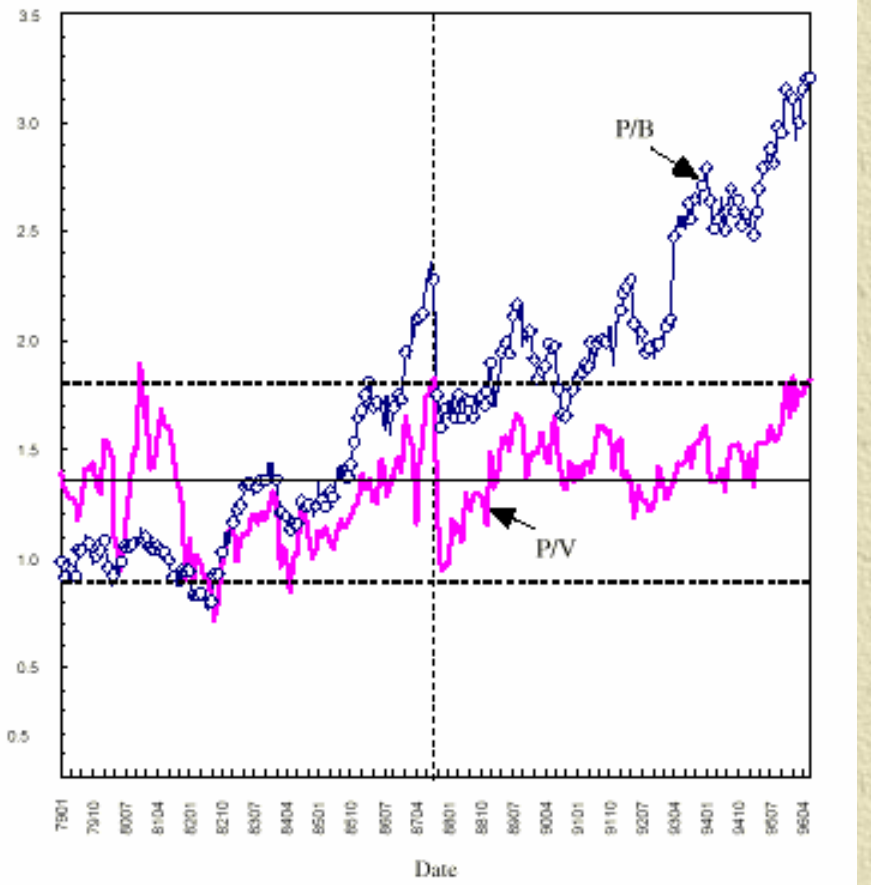



Figure 3. Price-to-book and price-to-value in recent years (January 1979 to June 1996)

This graph depicts the price-to-book (P/B) and price-to-value (P/V) ratios for the 30 Dow Jones Industrial Average (DJIA) stocks at monthly intervals between January 1979 and June 1996. B represents book value from the most recent fiscal year-end divided by shares outstanding at the end of each month. V is an estimate of intrinsic value based on a three-period residual-income model using I/B/E/S analyst consensus earnings forecasts, a short-term riskless rate and a market risk premium. Individual V and P estimates per share for each stock are aggregated to form the portfolio V and P measures. Horizonal solid line indicates the mean portfolio P/V ratio for the time period. Horizontal dotted lines indicate +/- two standard deviations based on the entire time period. The vertical lin indicates September 1987.

Source: Lee, Myers & Swaminathan, "What is the Intrinsic Value of the Dow," *Journal of Finance*, (Oct., 1999).

# Problems with Screening

- **You could be loading up on a risk factor**
  - ✓You need a risk model
- **You are in danger of trading with someone who knows more than you**
  - ✓You need a model that anticipates future payoffs
- ***A full-blown fundamental analysis supplies this***

# Asset Based Valuation

- Values the firm's assets and then subtracts the value of debt:
- The balance sheet does this calculation, but imperfectly:
  - ✓Shareholders' Equity = Total Assets -Total Liabilities
- Problems with this approach:
  - ✓Getting the value of operating assets when there is not a market for them
  - ✓Identifying value in use for a particular firm
  - ✓Getting the value of intangible assets (brand names, R&D)
  - ✓Getting the value of "synergies" of assets being used together
- Applications:
  - ✓"Asset-based" firms such as oil and gas and mineral products
  - ✓Calculating liquidation value

# Cash Accounting, Accrual Accounting, and Discounted Cash Flow Analysis

# Business Activities

- Financing Activities: Raising cash from investors and returning cash to investors
- Investing Activities: Investing cash raised from investors in operational assets
- Operating Activities: Utilizing investments to produce and sell products

# What Creates Value in a Firm ?

- Equity Financing Activities ?
  - ✓Share Issues ?
  - ✓Share Repurchases ?
  - ✓Dividends ?
- Debt Financing Activities ?
- Investing and Operating Activities?
  - ✓Distinguish anticipated (exante) value in investing activities from realized (expost) value in operations
- Value is created in product and factor markets

# The No Arbitrage Condition (NA)

- **If the price paid for a stock is** $P_0 = \frac{P_1 + d_1}{\rho_E}$

  **(expected payoff discounted at the required payoff per dollar, ρ), the stock is appropriately priced: the market price is *efficient***

- **Or, price is efficient if it equals the expected return capitalized at the required rate-of-return:**

$$P_0 = \frac{P_1 + d_1 - P_0}{\rho_E - 1}$$

- **Or, today's price ($P_0$) must be such that the required rate-of-return, ρ - 1, will equal the (expected) rate-of-return:**

$$\rho_E - 1 = \frac{P_1 + d_1 - P_0}{P_0}$$

**Required Rate-of Return = Expected Rate-of-Return**

# Arbitrage Trading Strategies

- **If NA holds, the market is *efficient* for that stock: there is no arbitrage opportunity**
- **Any discrepancy between *expected* and *required rate-of-return*, is an *arbitrage opportunity* that, if exploited, will profit the arbitrage trader.**
- **An arbitrage opportunity arises if**

- **If** $\dfrac{P_1 + d_1 - P_0}{P_0} > \rho_E - 1$ **then BUY**
- **If** $\dfrac{P_1 + d_1 - P_0}{P_0} < \rho_E - 1$ **then SELL**

**The difference is called the *expected abnormal return* and the rule can be restated as: BUY if the expected abnormal return is positive, and SELL if negative. If it is zero, do nothing (HOLD)**

# Measuring Returns
# Hewlett-Packard: Returns for 1991

Hewlett-Packard Company: Returns for 1991

Required return is 12%


Logo used with permission of Hewlett Packard

| | |
|---|---|
| Price at end of 1991 | $50.375 |
| 1991 Dividend | .480 |
| 1991 Payoff | 50.855 |
| Price at end of 1990 | 26.000 |
| 1991 Return | 24.855 |

Rate of return = $24.855 / 26.0

= 95.6%

# Hewlett-Packard: Returns for 1991

Required return is 12%

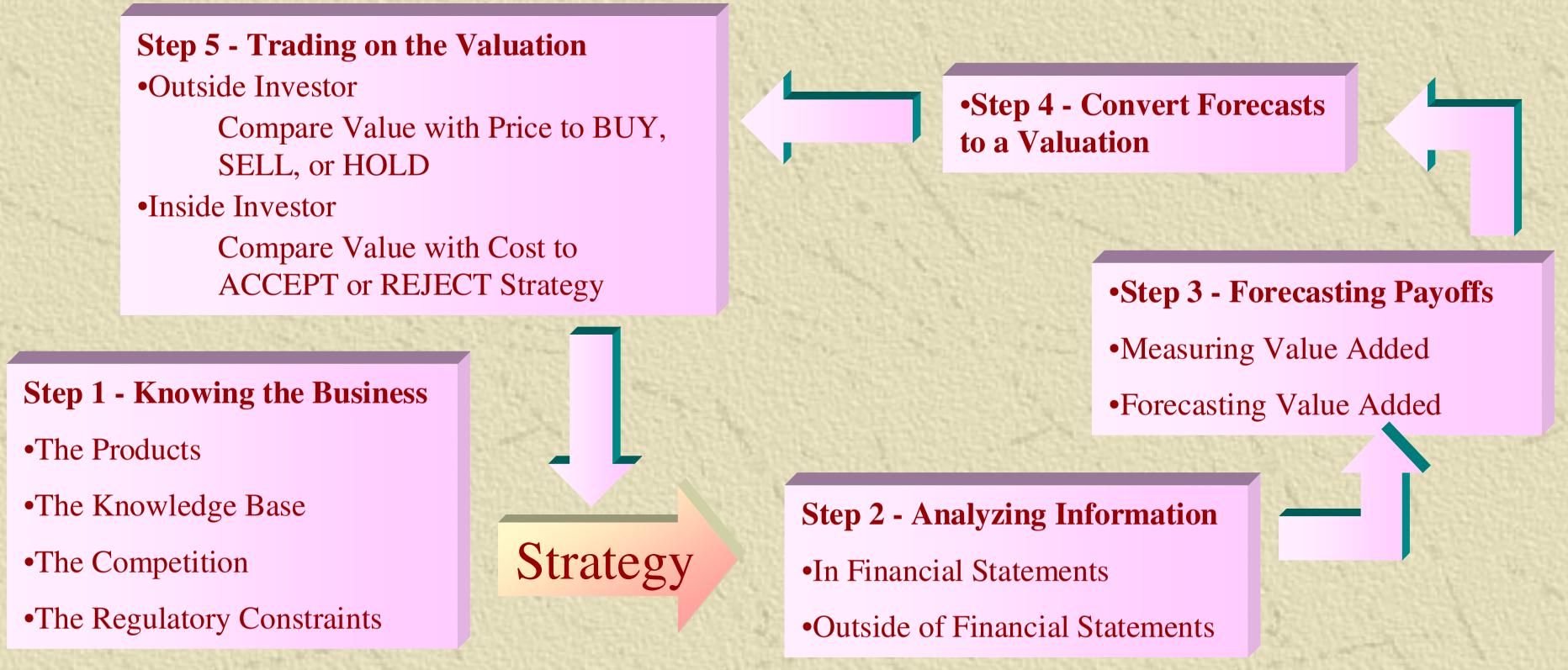
| | |
|---|---|
| Price at end of 1991 | $50.375 |
| 1991 Dividend | .480 |
| 1991 Payoff | 50.855 |
| Price at end of 1990 | 26.000 |
| 1991 Return | 24.855 |




| | |
|---|---|
| Rate of return = $24.855/26.000 = 95.6% | |
| Normal return: $26 x .12 | 3.120 |
| Abnormal return | 21.735 |
| Abnormal rate of return = 21.735/26.00 = | 83.6% |

| | |
|---|---|
| Rate of return | 95.6% |
| – Normal return | 12.0% |
| Abnormal rate of return | 83.6% |

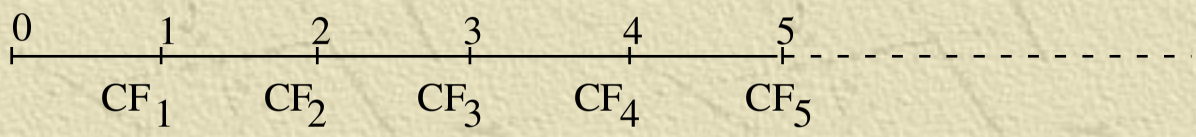
# The Process of Fundamental Analysis



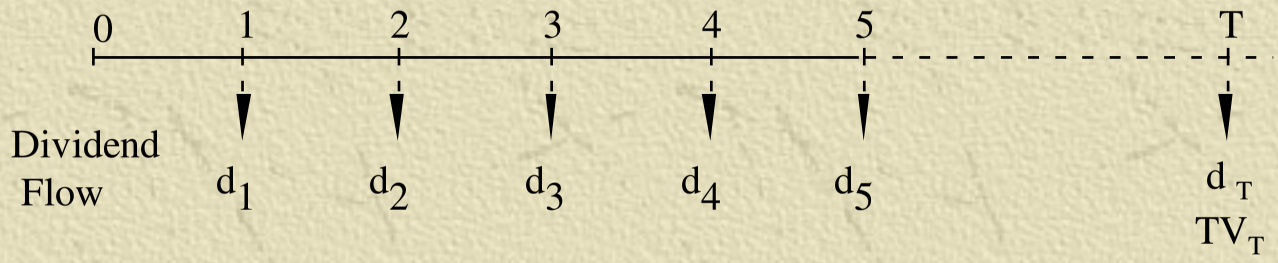

- A valuation model guides the process
- Forecasting is at the heart of the process and a valuation model specifies what is to be forecasted (Step 3) and how a forecast is converted to a valuation (Step 4). What is to be forecasted (Step 3) dictates the information analysis (Step 2)

# Valuation Models: Going Concerns

A Firm




Equity




The terminal value, $TV_T$ is the price payoff, $P_T$ when the share is sold

Valuation issues :

- The forecast target: dividends, cash flow, earnings?
- The time horizon: T = 5, 10, $\infty$ ?
- The terminal value
- The discount rate

# The Dividend Discount Model: Targeting Dividends

- DDM: $V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \cdots$

Problems: How far does one project?

- Does $V_0^E = \frac{d_1}{\rho_E} + \frac{d_2}{\rho_E^2} + \frac{d_3}{\rho_E^3} + \cdots + \frac{d_T}{\rho_E^T}$

provide a good estimate of $V^E_0$?

(i) Dividend policy can be arbitrary and not linked to value added.
(ii) The firm can borrow to pay dividends; this does not create value
(iii) Think of a firm that "pays no dividends"

- The *dividend irrelevancy concept*
- The *dividend conundrum*:
  - ✓Equity value is based on future dividends, but forecasting dividends over finite horizons does not give an indication of this value
- Conclusion: Focus on creation of wealth rather than distribution of wealth.

# Some Math: The Value of a Perpetuity and a Perpetuity with Growth

## The Value of a Perpetuity

A perpetuity is a constant stream that continues without end. A constant stream is sometimes referred to as an annuity, so a perpetuity is an annuity that continues forever. To value that stream, one capitalizes the constant amount expected. If the dividend expected next year is expected to be a perpetuity, the value of the dividend stream is

**Value of a perpetual dividend stream =** $V_0^E = \dfrac{d_1}{\rho_E - 1}$

## The Value of a Perpetuity with Growth

If an amount is forecasted to grow at a constant rate, its value can be calculated by capitalizing the amount at the required return adjusted for the growth rate:

**Value of a dividend growing at a constant rate =** $V_0^E = \dfrac{d_1}{\rho_E - g}$

# Terminal Values for the DDM Model

A. Capitalize expected terminal dividends

$$TV_T = P_T = \frac{d_{T+1}}{\rho_E - 1}$$

B. Capitalize expected terminal dividends with growth

$$TV_T = P_T = \frac{d_{T+1}}{\rho_E - g}$$

Will it work?

# Dividend Discount Analysis: Advantages and Disadvantages

## *Advantages*

- ***Easy concept:*** dividends are what shareholders get, so forecast them
- ***Predictability:*** dividends are usually fairly stable in the short run so dividends are easy to forecast (in the short run)

## *Disadvantages*

- ***Relevance:*** dividends payout is not related to value, at least in the short run; dividend forecasts ignore the capital gain component of payoffs.

## *When It Works Best*

- When payout is permanently tied to the value generation in the firm. For example, when a firm has a fixed payout ratio (dividends/earnings).

# Cash Flows for a Going Concern

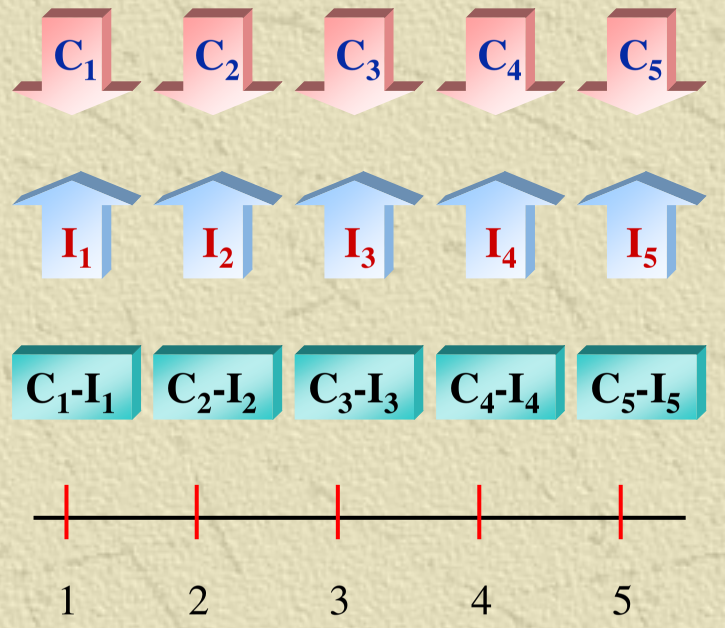
Free cash flow is cash flow from operations that results from investments minus cash used to make investments.

**Cash flow from operations (inflows)**

**Cash investment (outflows)**

**Free cash flow**

**Time, t**



# The Discounted Cash Flow (DCF) Model

| | | | | | | |
|---|---|---|---|---|---|---|
| Cash flow from operations (inflows) | $C_1$ | $C_2$ | $C_3$ | $C_4$ | $C_5$ | ---> |
| Cash investment (outflows) | $I_1$ | $I_2$ | $I_3$ | $I_4$ | $I_5$ | ---> |
| Free cash flow | $C_1 - I_1$ | $C_2 - I_2$ | $C_3 - I_3$ | $C_4 - I_4$ | $C_5 - I_5$ | ---> |
| Time, t | 1 | 2 | 3 | 4 | 5 | ---> |

$$V_0^E = V_0^F - V_0^D$$

$$V_0^E = \frac{\overline{C}_1 - \overline{I}_1}{\rho_F} + \frac{\overline{C}_2 - \overline{I}_2}{\rho_F^2} + \frac{\overline{C}_3 - \overline{I}_3}{\rho_F^3} + - - - \frac{\overline{C}_T - \overline{I}_T}{\rho_F^T} + \frac{\overline{CV}_T}{\rho_F^T} - V_0^D$$

$$V_O^F$$

# The Continuing Value for the DCF Model

A. Capitalize terminal free cash flow

$$CV_T = \frac{C_{T+1} - I_{T+1}}{\rho_F - 1}$$

B. Capitalize terminal free cash flow with growth

$$CV_T = \frac{C_{T+1} - I_{T+1}}{\rho_F - g}$$

Will it work?

# DCF Valuation: The Coca-Cola Company

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|
| Cash from operations | | 3,657 | 4,097 | 4,736 | 5,457 | 5,929 |
| Cash investments | | 947 | 1,187 | 1,167 | 906 | 618 |

Required return is 9%
Book value of net debt is 4,435
Shares outstanding are 2,472
Assume growing FCF at 5% after period T
Value per share ?

# DCF Valuation: The Coca-Cola Company

In millions of dollars except share and per-share numbers. Required return for the firm is 9%

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|
| Cash from operations | | 3,657 | 4,097 | 4,736 | 5,457 | 5,929 |
| Cash investments | | 947 | 1,187 | 1,167 | 906 | 618 |
| Free cash flow | | 2,710 | 2,910 | 3,569 | 4,551 | 5,311 |
| Discount rate (1.09)t | | 1.09 | 1.1881 | 1.2950 | 1.4116 | 1.5386 |
| Present value of free cash flows | | 2,486 | 2,449 | 2,756 | 3,224 | 3,452 |
| Total present value to 2004 | 14,367 | | | | | |
| Continuing value (CV)* | | | | | | 139,414 |
| Present value of CV 90,611 | | | | | | |
| Enterprise value | 104,978 | | | | | |
| Book value of net debt | 4,435 | | | | | |
| Value of equity () | 100,543 | | | | | |
| Shares outstanding | 2,472 | | | | | |
| Value per share | $40.67 | | | | | |

*CV = $\frac{5{,}311 \times 1.05}{1.09 - 1.05} = 139{,}414$

Present value of CV = $\frac{139{,}414}{1.5386} = 90{,}611$

# The DCF Model: Will it work for Wal-Mart Stores?

Wal-Mart Stores, Inc.

(Fiscal years ending January 31. Amounts in millions of dollars.)

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 |
|---|---|---|---|---|---|---|---|---|---|
| Cash from operations | 536 | 828 | 968 | 1,422 | 1,553 | 1,540 | 2,573 | 3,410 | 2,993 |
| Cash investments | 627 | 541 | 894 | 1,526 | 2,150 | 3,506 | 4,486 | 3,792 | 3,332 |
| Free cash flow | (91) | 287 | 74 | (104) | (597) | (1,966) | (1,913) | (382) | (339) |
| Dividends per share | 0.03 | 0.04 | 0.06 | 0.07 | 0.09 | 0.11 | 0.13 | 0.17 | 0.20 |
| Price per share | 6⅞ | 8½ | 10⅝ | 16½ | 27 | 32½ | 26½ | 25⅞ | 24⅜ |

# Why Free Cash Flow is not a Value-Added Concept

- Cash flow from operations (value added) is reduced by investments (which also add value): investments are treated as value losses
- Value received is not matched against value surrendered to generate value

A firm reduces free cash flow by investing and increases free cash flow by reducing investments:
free cash flow is partially a liquidation concept

Note: analysts forecast earnings, not cash flows

# Discounted Cash Flow Analysis: Advantages and Disadvantages

## *Advantages*

- ***Easy concept:*** cash flows are "real" and easy to think about; they are not affected by accounting rules
- ***Familiarity:*** is a straight application of familiar net present value techniques

## *Disadvantages*

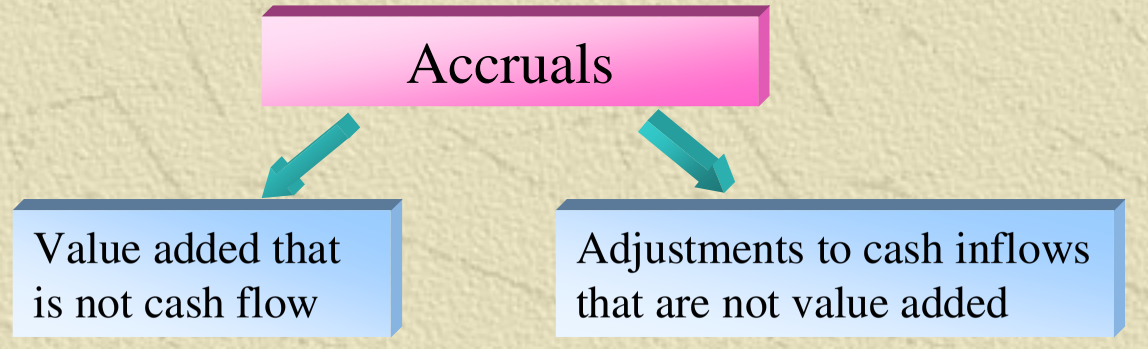
- ***Suspect concept:***
  - ✓ free cash flow does not measure value added in the short run; value gained is not matched with value given up.
  - ✓ free cash flow fails to recognize value generated that does not involve cash flows
  - ✓ investment is treated as a loss of value
  - ✓ free cash flow is partly a liquidation concept; firms increase free cash flow by cutting back on investments.
- ***Forecast horizons:*** typically requires forecasts for long periods; terminal values for shorter periods are hard to calculate with any reliability
- ***Validation:*** it is hard to validate free cash flow forecasts
- ***Not aligned with what people forecast:*** analysts forecast earnings, not free cash flow; adjusting earnings forecasts to free cash forecasts requires further forecasting of accruals.

## *When It Works Best*

- When the investment pattern is such as to produce constant free cash flow or free cash flow growing at a constant rate.

# Features of the Income Statement

1. Dividends don't affect income
2. Investment doesn't affect income
3. There is a matching of
   - ✓Value added (revenues)
   - ✓Value lost (expenses)
   - ✓Net value added (net income)
4. Accruals adjust cash flows



# Earnings and Cash Flows

Earnings = [C - I] - i + I + accruals

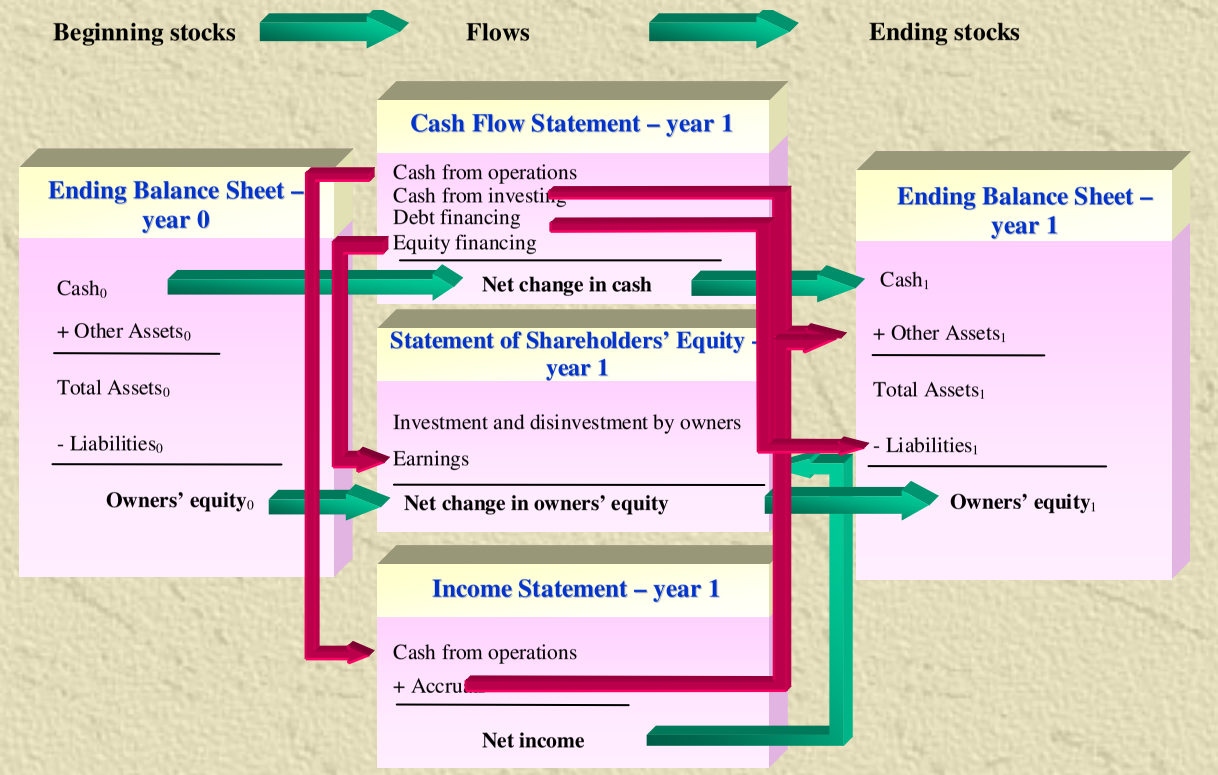
= C - i + accruals

- The earnings calculation adds back investments and puts them back in the balance sheet. It also adds accruals.

# The articulation of the financial statements through the recording of cash flows and accruals

*Net cash flows from all activities increases cash in the balance sheet*
*Cash from operations increases net income and shareholders' equity*
*Cash investments increase other assets*
*Cash from debt financing increases liabilities*
*Cash from equity financing increases shareholders' equity*

*Accruals increase net income, shareholders' equity, assets and liabilities*



# Accrual Accounting and Valuation: Pricing Book Values

# Valuation of Investments

**Value of Investment = Book Value of Investment + Value added from Investment**

**Value added from Investment is expressed though *Residual Earnings***

**Residual Earnings: Earnings above or below a normal level.**

**Q: Normal Level ?**

**A: Required return X Investment**

# Valuing a One-Period Project (1)

**Investment** **$400**
**Required return** **10%**
**Revenue forecast** **$440**
**Expense forecast** **$400**
**Forecasted earnings** **$ 40** **(Revenue $440 - Depreciation $400)**

$$\text{Residual earnings}_1 = \text{Earnings}_1 - (\text{Required return} \times \text{Investment})$$

$$= 40 - (0.10 \times 400)$$

$$= 0$$

$$\text{Value} = 400 + \frac{0}{1.10}$$

$$= 400$$

**This is a Zero-RE project**

**This is a zero NPV project:**

**DCF Valuation:** $V = \frac{440}{1.10} = 400$

# Valuing a One-Period Project (2)

| | |
|---|---|
| Investment | $400 |
| Required return | 10% |
| Revenue forecast | $448 |
| Expense forecast | $400 |
| Earnings forecast | $ 48 (Revenue $448- Depreciation $400) |

$$\text{Residual earnings}_1 = 48 - (0.10 \times 400) = 8$$

$$\text{Value Project} = 400 + \frac{8}{1.10} = 407.27$$

The project adds value

$$\left[\text{DCF value} = \frac{448}{1.10} = 407.27\right]$$

# Valuing a Savings Account

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| *Earnings withdrawn each year (full payout)* | | | | | | |
| Earnings | | 5 | 5 | 5 | 5 | 5 |
| Dividends | | 5 | 5 | 5 | 5 | 5 |
| Book value | 100 | 100 | 100 | 100 | 100 | 100 |
| Residual earnings | | 0 | 0 | 0 | 0 | 0 |
| *No withdrawals (zero payout)* | | | | | | |
| Earnings | | 5 | 5.25 | 5.51 | 5.79 | 6.08 |
| Dividends | | 0 | 0 | 0 | 0 | 0 |
| Book value | 100 | 105 | 110.25 | 115.76 | 121.55 | 127.63 |
| Residual earnings | | 0 | 0 | 0 | 0 | 0 |

Value = Book Value + Present Value of Residual Earnings

= 100 + 0

= 100

# Lessons from the Savings Account

1. An asset is worth a premium or discount to its book value only if the book value is expected to earn non-zero residual earnings.

2. Residual earnings techniques recognize that earnings growth does not add value if that growth comes from investment earning at the required return.

3. Even though an asset does not pay dividends, it can be valued from its book value and earnings forecasts.

4. The valuation of the savings account does not depend on dividend payout. The two scenarios have different expected dividends, but the same value.

5. The valuation of a savings account is unrelated to free cash flows: The two accounts have the same value, but different free cash flow.

# Price-to-Book Ratio

P/B ratio is based on expected future earnings that have been not yet recognized to the book value. Thus, if

- expected future earnings are equal to required earnings (i.e., normal earnings) then we get "normal" P/B = 1.

- expected future earnings are above required earnings (i.e., positive abnormal earnings) then we get P/B > 1.

- expected future earnings are below required earnings (i.e., negative abnormal earnings) then we get P/B < 1.

# A Model for Anchoring Value on Book Value

$$\text{Value of common equity } \left(V_0^E\right) = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \frac{RE}{\rho_E^3} + \ldots$$

where RE is residual earnings for equity:

Residual earnings = comprehensive earnings - (required return for equity x beginning - of - period book value)

$$RE_t = Earn_t - (\rho_E - 1)B_{t-1}$$

# Derivation of the Equity Valuation Model: One Period

Valuing a one-period payoff equation:

$$P_0 = \frac{(P_1 + d_1)}{\rho_E}$$

Substitute for the expected dividend

$$d_1 = \text{Earnings}_1 - (B_1 - B_0)$$

to get

$$P_0 = \frac{\text{Earnings}_1 - (B_1 - B_0) + P_1}{\rho_E}$$

or

$$P_0 = B_0 + \frac{\text{Earnings}_1 - (\rho_E - 1)B_0}{\rho_E} + \frac{P_1 - B_1}{\rho_E}$$

The amount, $\text{Earnings}_1 - (\rho_E - 1)B_0$ is called ***Residual Earnings***

# Derivation of the Equity Valuation Model: Multiperiod

**Substituting comprehensive earnings and book value for dividends *in each period*,**

$$P_0 = B_0 + \frac{\text{Earnings}_1 - (\rho_E - 1)B_0}{\rho_E} + \frac{\text{Earnings}_2 - (\rho_E - 1)B_1}{\rho_E^2} + \ldots$$
$$\ldots + \frac{\text{Earnings}_T - (\rho_E - 1)B_{T-1}}{\rho_E^T} + \frac{P_T - B_T}{\rho_E^T}$$

If we set $RE_t = \text{Earnings}_t - (\rho_E - 1)B_{t-1}$

$$P_0 = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \ldots. + \frac{RE_T}{\rho_E^T} + \frac{P_T - B_T}{\rho_E^T}$$

As efficient prices equal intrinsic values, then

$$V_0^E = B_0 + \frac{RE_1}{\rho_E} + \frac{RE_2}{\rho_E^2} + \ldots.. + \frac{RE_T}{\rho_E^T} + \frac{V_T^E - B_T}{\rho_E^T}$$

# The Continuing Value for the RE Model

**Premium** $\left(V_T^E - B_T\right)$ **is assessed through the present value of residual earnings:**

**i.e., the continuing value** $\left(CV_T\right)$ **of the model.**

**Case 1: RE is forecasted to be zero in perpetuity after T**

**So** $CV_T = 0$

**Case 1I: RE is forecasted to be constant in perpetuity after T**

**So** $CV_T = \dfrac{RE_{T+1}}{\rho_E - 1}$

**Case 1II: RE is forecasted to grow at constant rate in perpetuity after T**

**So** $CV_T = \dfrac{RE_{T+1}}{\rho_E - g}$

# Alternative Measure of Residual Earnings

$$\text{ROCE}_t = \frac{\text{Comprehensive earnings to common}_t}{\text{Book value}_{t-1}}$$

Residual earnings is the rate of return on equity, ROCE, expressed as a dollar excess return on equity rather than a ratio. But it can be expressed in ratio form:

$$\text{Earnings}_t - (\rho_E - 1)B_{t-1} = [\text{ROCE}_t - (\rho_E - 1)]B_{t-1}$$

# Drivers of Residual Earnings

Two Drivers:

1. ROCE

- If forecasted ROCE equals the required return, then RE will be zero, and V = B
- If forecasted ROCE is greater than the required return, then V > B
- If forecasted ROCE is less than the required return, then V < B

2. Growth in book value (net assets) put in place to earn the ROCE

RE will change with change with ROCE and growth in book value

# P/B, ROCE and Growth in Book Value

| | P/B in 2003 | ROCE in 2004 | Growth Rate for Book Value in 2004 |
|---|---|---|---|
| The Gap Inc. | 4.23 | 28.1% | 30.7% |
| General Electric Co. | 4.16 | 22.3% | 39.3% |
| Verizon Communications Inc. | 3.32 | 23.4% | 12.2% |
| Citigroup Inc. | 2.79 | 17.4% | 11.5% |
| Home Depot Inc. | 2.62 | 19.2% | 13.2% |
| General Motors Corp. | 1.19 | 11.1% | 9.7% |
| Federated Department Stores | 0.92 | 12.0% | 3.1% |

# Valuing Flanigan's Enterprises
# Case 1: Zero RE after T

| | | Forecast Year | | | |
|---|---|---|---|---|---|
| | **1999** | **2000** | **2001** | **2002** | **2003** |
| Eps | | 0.73 | 0.80 | 0.71 | 0.47 |
| Dps | | 0.11 | 0.24 | 0.25 | 0.27 |
| Bps | 3.58 | | | | |

Required rate of return is 9 %.
Assume zero RE after period T (zero premium at T).

$V_0^E$ ?

# Valuing Flanigan's Enterprises
# Case 1: Zero RE after T

| | | Forecast Year | | | |
|---|---|---|---|---|---|
| | **1999** | **2000** | **2001** | **2002** | **2003** |
| Eps | | 0.73 | 0.80 | 0.71 | 0.47 |
| Dps | | 0.11 | 0.24 | 0.25 | 0.27 |
| Bps | 3.58 | 4.20 | 4.76 | 5.22 | 5.41 |
| ROCE | | 20.4% | 19.0% | 14.9% | 9.0% |
| RE (9% charge) | | 0.408 | 0.422 | 0.282 | 0.000 |
| Discount rate (1.09) | | 1.09 | 1.188 | 1.295 | 1.412 |
| Present value of RE | | 0.374 | 0.355 | 0.217 | 0.000 |
| Total present value of RE to 2003 | 0.95 | | | | |
| Value per share | 4.53 | | | | |

Assuming zero RE after period T (zero premium at T): $V_0^E = 3.58 + 0.95 = 4.53$

# Valuing General Electric
# Case 2: Constant RE after T

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** |
| ***Eps*** | | **1.29** | **1.38** | **1.42** | **1.50** | **1.60** |
| **Dps** | | **0.57** | **0.66** | **0.73** | **0.77** | **0.82** |
| **Bps** | **4.32** | | | | | |

Required rate of return is 10 %.

Assume constant RE after period T:

$V_0^E$ ?

# Valuing General Electric
# Case 2: Constant RE after T

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| *Eps* | | 1.29 | 1.38 | 1.42 | 1.50 | 1.60 |
| Dps | | 0.57 | 0.66 | 0.73 | 0.77 | 0.82 |
| Bps | 4.32 | 5.04 | 5.76 | 6.45 | 7.18 | 7.96 |
| ROCE | | 29.9% | 27.4% | 24.7% | 23.3% | 22.3% |
| RE (10% charge) | | 0.858 | 0.876 | 0.844 | 0.855 | 0.882 |
| Discount rate (1.10) | | 1.100 | 1.210 | 1.331 | 1.464 | 1.611 |
| Present value of RE | | 0.780 | 0.724 | 0.634 | 0.584 | 0.548 |
| Total present value of RE to 2004 | 3.27 | | | | | |
| Continuing value (CV) | | | | | | 8.82 |
| Present value of CV | 5.48 | | | | | |
| Value per share | 13.07 | | | | | |

**The continuing value:**

**CV =** $\frac{0.882}{0.10}$ **= 8.82**

**Present value of continuing value =** $\frac{8.82}{1.6105}$ **= 5.48**

Assuming constant RE after period T: $V_0^E = 4.32 + 3.27 + 5.48 = 13.07$

# Valuing Dell Inc.
# Case 3: Growing RE after T

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** |
| Eps | | 0.84 | 0.48 | 0.82 | 1.03 | 1.18 |
| Dps | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bps | 2.06 | | | | | |

Required rate of return is 11 %.
Assume growing RE at 6.5% after period T :
$V_0^E$ ?

# Valuing Dell Inc.
# Case 3: Growing RE after T

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** |
| Eps | | 0.84 | 0.48 | 0.82 | 1.03 | 1.18 |
| Dps | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bps | 2.06 | 2.90 | 3.38 | 4.20 | 5.23 | 6.41 |
| ROCE | | 40.8% | 16.6% | 24.3% | 24.5% | 22.6% |
| RE (11% charge) | | 0.613 | 0.161 | 0.448 | 0.568 | 0.605 |
| Discount rate $(1.11)^t$ | | 1.110 | 1.232 | 1.368 | 1.518 | 1.685 |
| Present value of RE | | 0.553 | 0.131 | 0.328 | 0.374 | 0.359 |
| Total present value of RE to 2005 | 1.75 | | | | | |
| Continuing value (CV) | | | | | | 14.32 |
| Present value of CV | 8.50 | | | | | |
| Value per share | 12.31 | | | | | |

The continuing value (with growth at 6.5%):

$$CV = \frac{0.605 \times 1.065}{1.11 - 1.065} = 14.32$$

$$\text{Present value of continuing value} = \frac{14.32}{1.685} = 8.50$$

Assuming growing RE after period T : $V_0^E = 2.06 + 1.75 + 8.50 = 12.31$

# Forecasting Target Prices by Analysts

$$\text{Target Price}_T = B_T + CV_T$$

Case 1 (Flannigan's): $V_{2003}^E = B_{2003} = 5.41$

Case 2 (GE): $V_{2004}^E = B_{2004} + CV_{2004} = 7.96 + 8.82 = 16.78$

Case 3 (Dell): $V_{2005}^E = B_{2005} + CV_{2005} = 6.41 + 14.32 = 20.73$

# Converting an Analyst's Forecast to a Valuation: Nike Inc.

**1) Bps (2004): $18.17**

**2) Constant Payout Ratio (dividends to earnings) : 0.206**

**3) Earnings Forecasts:**

**2005 $4.45**

**2006 $5.04**

**Five-year eps growth rate: 14%**

**4) Required Rate of Return: 10%**

**5) Assume growing RE at GDP growth rate of 4% after T**

**Price = $75**

$V_0^E$ ?

# Converting an Analyst's Forecast to a Valuation: Nike Inc.

| | 2004A | 2005E | 2006E | 2007E | 2008E | 2009E |
|---|---|---|---|---|---|---|
| Eps | | 4.45 | 5.04 | 5.75 | 6.55 | 7.47 |
| Dps | | 0.92 | 1.04 | 1.18 | 1.35 | 1.54 |
| Bps | 18.17 | 21.70 | 25.71 | 30.27 | 35.47 | 41.40 |
| ROCE | | 24.49% | 23.23% | 22.36% | 21.64% | 21.06% |
| RE (10% charge) | | 2.633 | 2.870 | 3.175 | 3.523 | 3.920 |
| Discount rate (1.10)t | | 1.110 | 1.210 | 1.331 | 1.464 | 1.611 |
| Present value of RE | | 2.394 | 2.372 | 2.386 | 2.406 | 2.434 |
| Total PV to 2009 | 11.99 | | | | | |
| Continuing value (CV) | | | | | | 67.95 |
| Present value of CV | 42.19 | | | | | |
| Value per share | 72.35 | | | | | |

**The continuing value (with growth at GDP growth rate of 4%):**

$$\text{CV} = \frac{3.920 \times 1.04}{1.10 - 1.04} = 67.95$$

# Residual Earnings Model : Advantages and Disadvantages

## *Advantages*

- ***Focus on value drivers:*** focuses on profitability of investment and growth in investment that drive value; directs strategic thinking to these drivers
- ***Incorporates the financial statements:*** incorporates the value already recognized in the balance sheet (the book value); forecasts the income statement and balance sheet rather than the cash flow statement
- ***Uses accrual accounting:*** uses the properties of accrual accounting that recognize value added ahead of cash flows, matches value added to value given up and treats investment as an asset rather than a loss of value
- ***Versatility:*** can be used with a wide variety of accounting principles.
- ***Aligned with what people forecast:*** analysts forecast earnings (from which forecasted residual earnings can be calculated)
- ***Validation:*** forecasts of residual earnings can be validated in subsequent audited financial statements
- ***Predictability:*** dividends are usually fairly stable in the short run so dividends are easy to forecast (in the short run)

## *Disadvantages*

- ***Accounting complexity:*** requires an understanding of how accrual accounting works
- ***Suspect accounting:*** relies on accounting numbers that can be suspect.

# A Simple Demonstration

**In millions of dollars. Required return is 10% per year.**

| | Forecast Year | | | | | |
|---|---|---|---|---|---|---|
| | **0** | **1** | **2** | **3** | **4** | **5** |
| Earnings | 12.00 | 12.36 | 12.73 | 13.11 | 13.51 | 13.91 |
| Dividends | 9.09 | 9.36 | 9.64 | 9.93 | 10.23 | 10.53 |
| Book value | 100.00 | 103.00 | 106.09 | 109.27 | 112.55 | 115.93 |
| RE (10% charge) | | 2.36 | 2.43 | 2.50 | 2.58 | 2.66 |
| RE growth rate | | | 3% | 3% | 3% | 3% |

$$V_0^E = B_0 + \frac{\dot{RE}_1}{\rho - g} = \$100 + \frac{\$2.36}{1.10 - 1.03} = \$133.71 \ million$$

**The intrinsic price-to-book ratio (P/B) is $133.71 / $100 = 1.34.**

# Protection from Paying Too Much for Earnings Generated by Investment

**Invest $50 million in Year 1 with proceeds from a share issue:**

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | **0** | **1** | **2** | **3** | **4** | **5** |
| Earnings | 12.00 | 12.36 | 17.73 | 18.61 | 19.56 | 20.57 |
| Net dividends | 9.09 | (40.64) | 9.64 | 9.93 | 10.23 | 10.53 |
| Book value | 100.00 | 153.00 | 161.09 | 169.77 | 179.10 | 189.14 |
| RE (10% charge) | | 2.36 | 2.43 | 2.50 | 2.58 | 2.66 |
| RE growth rate | | | 3% | 3% | 3% | 3% |

**Beware!**


$$V_0^E = \$100 + \frac{\$2.36}{1.10 - 1.03} = \$133.71 \ million$$

# Creative Accounting

- Suppose that the manager of the firm decided to create more earnings for Year 1 by writing down inventory by $8 in year 0.

- loss from inventory will be $8 in year 0, while cost of goods will be understated by the same amount in Year 1.

- Earnings will be $4 (12-8) in year 0 and $20.36 (12.36+8) in Year 1.

- Clean surplus accounting implies that book value will be $92 (100-8) in year 0.

:

# Protection from Paying Too Much for Earnings Created by the Accounting: the Simple Example

**Writing inventory down by $8 million in Year 0 creates lower \ cost-of-goods sold in Year 1:**

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | **0** | **1** | **2** | **3** | **4** | **5** |
| Earnings | 4.00 | 20.36 | 12.73 | 13.11 | 13.51 | 13.91 |
| Dividends | 9.09 | 9.36 | 9.64 | 9.93 | 10.23 | 10.53 |
| Book value | 92.00 | 103.00 | 106.09 | 109.27 | 112.55 | 115.93 |
| RE (10% charge) | | 11.16 | 2.43 | 2.50 | 2.58 | 2.66 |
| RE growth rate | | | | 3% | 3% | 3% |

$$V_0^E = \$92 + \frac{11.16}{1.10} + \left[ \frac{2.43}{(1.10 - 1.03)/1.10} \right] = \$113.71 \ million$$

**Beware!**

# Accrual Accounting and Valuation: Pricing Earnings

# The Concept Behind the P/E Ratio

- Price in numerator of P/E is based on expected future earnings
- Earnings in denominator is current (or forward) earnings
- P/E is thus based on expected growth in earnings

# The Trailing P/E and Forward P/E

$$\text{Forward P/E} = \frac{\text{Price}_0}{\text{Earnings}_1}$$

$$\text{Trailing P/E} = \frac{\text{Price}_0 + \text{Dividend}_0}{\text{Earnings}_0}$$

[Dividends reduce current price, but not current earnings]

$$\text{Normal Forward P/E} = \frac{1}{\text{required return}}$$

$$\text{Normal Trailing P/E} = \frac{1 + \text{required return}}{\text{required return}}$$

$$\text{Normal Forward P/E} = \text{Normal Trailing P/E} - 1$$

# Valuation with Earnings

Value = Capitalized Forward Earnings +

Extra Value for Forecasted Earnings Growth

$$V = \frac{Earn_1}{\rho_E - 1} + \text{Extra Value for Forecasted Abnormal Earnings Growth}$$

# The Prototype Savings Account

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| *Earnings withdrawn each year (full payout)* | | | | | | |
| Earnings | | 5 | 5 | 5 | 5 | 5 |
| Dividends | | 5 | 5 | 5 | 5 | 5 |
| Book value | 100 | 100 | 100 | 100 | 100 | 100 |
| Earnings growth rate | | 0 | 0 | 0 | 0 | 0 |
| *No withdrawals (zero payout)* | | | | | | |
| Earnings | | 5 | 5.25 | 5.51 | 5.79 | 6.08 |
| Dividends | | 0 | 0 | 0 | 0 | 0 |
| Book value | 100 | 105 | 110.25 | 115.76 | 121.55 | 127.63 |
| Earnings growth rate | | | 5% | 5% | 5% | 5% |

# Value of the Savings Account

**Full Payout Scenario:** $\text{Value} = \frac{\text{Earn}_1}{\rho - 1} = \frac{5}{0.05} = \$100$

- Logical? Yes, there is no earnings growth for the savings account.

**Zero Payout Scenario:** $\text{Value} = \frac{\text{Earn}_1}{\rho - g} = \frac{5}{1.05 - 1.05} = ?$

- Does not work for the savings account, but why? Yes, it is a bad P/E model, since it focuses only on normal earnings growth (i.e., growth rate equals required return: g=ρ=1.05) and ignores abnormal earnings growth (what if g>ρ?).
- But what do we mean with "abnormal earnings growth"? To answer the question, recall that the only difference between the two savings accounts is based on the payout ratio.

# Cum-Dividend Earnings

For the ***zero-payout*** account:

| | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Cum-dividend earnings | 5.00 | 5.25 | 5.51 | 5.79 | 6.08 |

For the ***full-payout*** account:

| | | | | | |
|---|---|---|---|---|---|
| Earnings in the account | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 |
| Dividend reinvested @ 5% | | 0.25 | 0.51 | 0.79 | 1.08 |
| Cum-dividend earnings | 5.00 | 5.25 | 5.51 | 5.79 | 6.08 |

$$\text{Cum-dividend earnings (2002)} =$$

$$\text{Earnings (2002)} + \left[0.05 \times \text{Dividend (2001)}\right]$$

The two accounts have different (ex-dividend) earnings growth, but the same cum-dividend earnings growth

# Normal Earnings

*Normal Earnings* is earnings growing at the required rate of return:

$$\text{Normal Earnings} = \rho_E \ \text{Earnings}_{t-1}$$

For the savings account:

$$\text{Normal Earnings (2002)} = 1.05 \times \text{Earnings (2001)}$$

$$= 1.05 \text{ x } 5.00 = 5.25$$

$$\text{Normal Earnings (2003)} = 1.05 \times 5.25$$

$$= 5.5125$$

# Abnormal Earnings Growth (AEG)

*Abnormal Earnings Growth* is growth over normal earnings growth

AEG = Cum-dividend earnings – Normal earnings

For the Savings account:

$$AEG(2002) = 5.25 - 5.25 = 0$$
$$AEG(2003) = 5.5125 - 5.5125 = 0$$

# Lessons from the Savings Account

1. An asset is worth capitalized forward earnings if abnormal earnings growth is expected to be zero.

2. An asset has a normal P/E ratio if abnormal earnings growth is expected to be zero.

3. Earnings comes from two sources:
   - ✓ earnings from the asset
   - ✓ earnings from reinvesting dividends

4. Ex-dividend growth rates are affected by dividends: dividends reduce assets which then earn lower earnings.

5. Cum-dividend growth rates are not affected by dividends (since they reflect earnings from dividends) : they are effectively the rates that firms would have if they did not pay dividends

# A Model of the Forward P/E

The model:

Value of equity = Capitalized forward earnings + Extra value for abnormal earnings growth

$$V_0^E = \frac{Earn_1}{\rho_E - 1} + \frac{1}{\rho_E - 1}\left[\frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$

$$= \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{AEG_2}{\rho_E} + \frac{AEG_3}{\rho_E^2} + \frac{AEG_4}{\rho_E^3} + \cdots\right]$$

The intrinsic P/E $\left(\frac{V_0^E}{Earn_1}\right)$ is given by dividing through by $Earn_1$

# Measuring Abnormal Earnings Growth for Equities

Abnormal earnings growth$_t$ (AEG$_t$) = Cum-dividend earn$_t$ - Normal earn$_t$

$$= [\text{Earn}_t + (\rho_E - 1)\, d_{t-1}] - \rho\, \text{Earn}_{t-1}$$

Dell: Required return = 11% Eps 2004 = $1.03
Nike: Required return = 10% Eps 2004 = $3.59

| | Dell Computer | | Nike Inc. | |
|---|---|---|---|---|
| | | $1.18 | | $4.45 |
| Eps 2005 | $0.00 | | $0.74 | |
| Dps 2004 | | $0.00 | | 0.074 |
| Earnings on reinvested dividends | | 1.18 | | 4.524 |
| Cum-dividend earnings 2005 | | | | |
| Normal earnings from 2004: | | | | |
| Dell: 1.03 x 1.11; Nike: 3.59 x 1.10 | | 1.143 | | 3.949 |
| Abnormal earnings growth (AEG) 2005 | | $0.037 | | $0.575 |

# Alternative Calculation of AEG

Abnormal earnings growth$_t$ = [$G_t$ – $\rho_E$] x Earnings$_{t-1}$

Where

$$G_t = \frac{Cum-dividend\ earnings_t}{Earnings_{t-1}}$$

For Nike:

$G_{2005}$ = 4.524/3.59 = 1.2602%  (a 26.02% growth rate)

$AEG_{2005}$= [1.2602 – 1.10] x 3.59 = $0.575

# Abnormal Earnings Growth is Equal to the Change in Residual Earnings

$$AEG_t = [earn_t + (\rho_E - 1)d_{t-1}] - \rho_E earn_{t-1}$$

$$= earn_t - earn_{t-1} - (\rho_E - 1)[earn_{t-1} - d_{t-1}]$$

By the stocks and flows equation for accounting for the book value of equity (Chapter 2),

$B_{t-1} = B_{t-2} + earn_{t-1} - d_{t-1}$, so $earn_{t-1} - d_{t-1} = B_{t-1} - B_{t-2}$. Thus,

$$AEG_t = earn_t - earn_{t-1} - (\rho_E - 1)[B_{t-1} - B_{t-2}]$$

$$= [earn_t - (\rho_E - 1)B_{t-1}] - [earn_{t-1} - (\rho_E - 1)B_{t-2}]$$

$$= RE_t - RE_{t-1}$$

So, the AEG model can be written as: $$V_0^E = \frac{1}{\rho_E - 1}\left[Earn_1 + \frac{\Delta RE_2}{\rho_E} + \frac{\Delta RE_3}{\rho_E^2} + \frac{\Delta RE_4}{\rho_E^3} + \ldots.\right]$$

# The Continuing Value for the AEG Model

**Case 1: AEG is forecasted to be zero in perpetuity after T**

**So** $CV_T = 0$

**Case 1I: AEG is forecasted to be constant in perpetuity after T**

**So** $$CV_T = \frac{AEG_{T+1}}{\rho_E - 1}$$

**Case 1II: AEG is forecasted to grow at constant rate in perpetuity after T**

**So** $$CV_T = \frac{AEG_{T+1}}{\rho_E - g}$$

# Valuing General Electric
# Case 1: Zero AEG after T

| | Forecast Year | | | | | |
|---|---|---|---|---|---|---|
| | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** |
| **Dps** | | **0.57** | **0.66** | **0.73** | **0.77** | **0.82** |
| **Eps** | | **1.29** | **1.38** | **1.42** | **1.50** | **1.60** |

Required rate of return is 10 %.

Assume zero AEG (i.e., constant RE) after period T:

$V_0^E$ ?

# Valuing General Electric
# Case 1: Zero AEG after T

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
| Dps | | 0.57 | 0.66 | 0.73 | 0.77 | 0.82 |
| Eps | | 1.29 | 1.38 | 1.42 | 1.50 | 1.60 |
| Dps reinvested at 10% | | | 0.057 | 0.066 | 0.073 | 0.077 |
| Cum-dividend earnings (eps + dps reinvested) | | | 1.437 | 1.486 | 1.573 | 1.677 |
| Normal earnings (1.10 x $eps_{t-1}$) | | | 1.419 | 1.518 | 1.562 | 1.650 |
| Abnormal earnings growth (AEG) | | | 0.018 | -0.032 | 0.011 | 0.027 |
| Discount rate ($1.10^t$) | | | 1.100 | 1.210 | 1.331 | 1.464 |
| PV of AEG | | | 0.016 | -0.026 | 0.008 | 0.018 |
| Total PV of AEG | | 0.017 | | | | |
| Total earnings to be capitalized | | 1.307 | | | | |
| Capitalization rate | | 0.10 | | | | |

Value per share $\left(\frac{1.307}{0.10}\right)$ 13.07

$$V_{1999}^{E} = \frac{1}{0.10}[1.29 + 0.017] = 13.07$$

Same as residual earnings valuation

# Valuing Dell Inc.
# Case 3: Growing AEG after T

| | | Forecast Year | | | | |
|---|---|---|---|---|---|---|
| | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** |
| Eps | | 0.84 | 0.48 | 0.82 | 1.03 | 1.18 |
| Dps | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bps | 2.06 | | | | | |

Required rate of return is 11 %.
Assume growing AEG at 6.5% after period T :
$V_0^E$ ?

# Valuing Dell Inc.
# Case 3: Growing AEG after T

| | | Forecast Year | | | | | |
|---|---|---|---|---|---|---|---|
| | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** |
| Dps | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eps | | 0.84 | 0.48 | 0.82 | 1.03 | 1.18 | 1.35 |
| Dps reinvested ($0.11 \times dps_{t-1}$) | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cum-dividend earnings | | | 0.48 | 0.82 | 1.03 | 1.18 | 1.349 |
| Normal earnings ($1.11 \times eps_{t-1}$) | | | 0.932 | 0.533 | 0.910 | 1.143 | 1.310 |
| Abnormal earnings growth | | | -0.452 | 0.287 | 0.120 | 0.037 | 0.039 |
| Discount rate ($1.11^t$) | | | 1.110 | 1.232 | 1.368 | 1.518 | |
| Present value of AEG | | | -0.408 | 0.233 | 0.088 | 0.025 | |
| Total PV of AEG | | -0.062 | | | | | |
| Continuing value (CV) | | | | | | 0.873 | |
| PV of CV | | 0.576 | | | | | |
| Total earnings to be capitalized | | 1.354 | | | | | |
| Capitalization rate | | 0.11 | | | | | |
| Value per share $\left(\frac{1.354}{0.11}\right)$ | 12.31 | | | | | | |

The continuing value calculation:

$$CV = \frac{0.0393}{1.11 - 1.065} = 0.873$$

$$\text{Present value of CV} = \frac{0.873}{1.5181} = 0.576$$

$$V^{E}_{2000} = \frac{1}{0.11}[0.84 - 0.062 + 0.576] = 12.31$$

Same as residual earnings valuation

# Converting an Analyst's Forecast to a Valuation: Nike Inc.

**1) Constant Payout Ratio (dividends to earnings) : 0.087**

**2) Earnings Forecasts:**

**2005 $3.43**

**2006 $3.81**

**Five-year eps growth rate: 14%**

**3) Required Rate of Return: 10%**

**4) Assume growing AEG at GDP growth rate of 4% after T**

**Price = $41**

$V_0^E$ ?

# Converting Analysts' Forecasts to a Valuation: Rebook International

| | 2004 | 2005E | 2006E | 2007E | 2008E | 2009E |
|---|---|---|---|---|---|---|
| Dps | | 0.30 | 0.33 | 0.38 | 0.43 | 0.49 |
| Eps | | 3.43 | 3.81 | 4.34 | 4.95 | 5.65 |
| Dps reinvested (0.10 x $dps_{t-1}$) | | | 0.030 | 0.033 | 0.038 | 0.043 |
| Cum-dividend earnings | | | 3.840 | 4.373 | 4.988 | 5.693 |
| Normal earnings (1.10 x $eps_{t-1}$) | | | 3.773 | 4.191 | 4.774 | 5.445 |
| Abnormal earnings growth | | | 0.067 | 0.182 | 0.214 | 0.248 |
| Cum-div eps growth rate | | | 11.95% | 14.78% | 14.93% | 15.00% |
| Discount rate ($1.10^t$) | | | 1.100 | 1.210 | 1.331 | 1.464 |
| Present value of AEG | | | 0.061 | 0.150 | 0.161 | 0.169 |
| Total PV of AEG | | 0.54 | | | | |
| Continuing value (CV) | | | | | | 4.299 |
| PV of CV | | 2.94 | | | | |
| Total earnings to be capitalized | | 6.91 | | | | |
| Capitalization rate | | 0.10 | | | | |
| Value per share $\left(\frac{6.91}{0.10}\right)$ | $69.10 | | | | | |

The continuing value calculation:

$$CV = \frac{0.248 \text{ x } 1.04}{1.10 - 1.04} = 4.299$$

Present value of CV $= \frac{4.299}{1.4641} = 2.94$

# Applying the Model: A Simple Example

Forecast for a firm with expected earnings growth of 3 percent per year (in dollars). Required return is 10% per year.

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| Earnings | 12.00 | 12.36 | 12.73 | 13.11 | 13.51 | 13.91 |
| Dividends | 9.09 | 9.36 | 9.64 | 9.93 | 10.23 | 10.53 |
| Book value | 100.00 | 103.00 | 106.09 | 109.27 | 112.55 | 115.93 |
| RE (0.10) | | 2.36 | 2.43 | 2.50 | 2.58 | 2.66 |
| RE growth rate | | | 3% | 3% | 3% | 3% |
| Earnings on reinvested dividends | | | 0.936 | 0.964 | 0.993 | 1.023 |
| Cum-dividend earnings | | | 13.667 | 14.077 | 14.499 | 14.934 |
| Normal earnings | | | 13.596 | 14.004 | 14.424 | 14.857 |
| Abnormal earnings growth | | | 0.071 | 0.073 | 0.075 | 0.077 |
| Earnings growth rate | | | 3% | 3% | 3% | 3% |
| Cum-dividend earnings growth rate | | | 10.6% | 10.6% | 10.6% | 10.6% |
| Abnormal earnings growth rate | | | | 3% | 3% | 3% |

Residual earnings valuation:

$$V^{E}_{2000} = 100 + \frac{2.36}{1.10 - 1.03} = 133.71$$

AEG valuation:

$$V^{E}_{2000} = \frac{1}{0.10}\left[12.36 + \frac{0.071}{1.10 - 1.03}\right] = 133.71$$

# Protection From Earnings Created by Accounting: A Restructuring Charge

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| Earnings | 4.00 | 20.36 | 12.73 | 13.11 | 13.51 | 13.91 |
| Dividends | 9.09 | 9.36 | 9.64 | 9.93 | 10.23 | 10.54 |
| Book value | 92.00 | 103.00 | 106.09 | 109.27 | 112.55 | 115.93 |
| Earnings on reinvested dividends | | | 0.936 | 0.964 | 0.993 | 1.023 |
| Cum-dividend earnings | | | 13.667 | 14.077 | 14.499 | 14.934 |
| Normal earnings | | | 22.396 | 14.004 | 14.424 | 14.857 |
| Abnormal earnings growth | | | (8.729) | 0.073 | 0.075 | 0.077 |
| Abnormal earnings growth rate | | | | 3% | 3% | 3% |

$$V_{2000}^{E} = \frac{1}{0.10}\left[20.36 - \frac{8.729}{1.10} + \frac{0.073}{1.10 - 1.03}\Big/1.10\right] = 133.71$$

# Abnormal Earnings Growth Analysis: Advantages and Disadvantages

### *Advantages*

- ***Easy to understand:*** Investors think in terms of future earnings; investors buy earnings. Focuses directly on the most common multiple used, the P/E ratio.
- ***Uses accrual accounting:*** Embeds the properties of accrual accounting by which revenues are matched with expenses to measure value added from selling products.
- ***Versatility:*** Can be used under a variety of accounting principles.
- ***Aligned with what people forecast:*** Analysts forecast earnings and earnings growth.

### *Disadvantages*

- ***Accounting complexity:*** Requires an understanding of how accrual accounting works.
- ***Concept complexity:*** Requires an appreciation of the concept of cum-dividend earnings; that is, value is based on earnings to be earned within the firm and from earnings from the reinvestment of dividends.
- ***Suspect accounting:*** Relies on earnings numbers that can be suspect.