

Security Analysis & Portfolio Management

Fundamental Analysis

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Investment Analytics

Course Content

- Why & how to apply Fundamental Analysis
- Industry Analysis
- Financial Statement Analysis
- Intrinsic Stock Valuation
 - Guideline Company Method

Firm Value

BALANCE SHEET

ASSETS	DEBT
	EQUITY

- Value of Assets = Value of Debt + Value of Equity
- $V = D + E$

Fundamental Analysis - Why?

- If you are going to buy the firm
- If you are going to lend money
- If you are going to make an equity investment

Fundamental Analysis - What?

➤ Buy Firm:

- All assets
- Going concern or breakup value?
- Change management, capital structure?
- Control premium

➤ Lend Money

- Debt
- How risky?
- Debt coverage ratios, etc.

Equity Investment

- You are buying into the firm as is:
 - Existing management, strategy, capital structure
- EMH says share price is fair value:
 - All information (historic, published, inside) is in the share price
- Fundamental analysis *only* makes sense if:
 - You have a superior method of analysis
 - You believe in possibility of market anomalies
 - Private firm

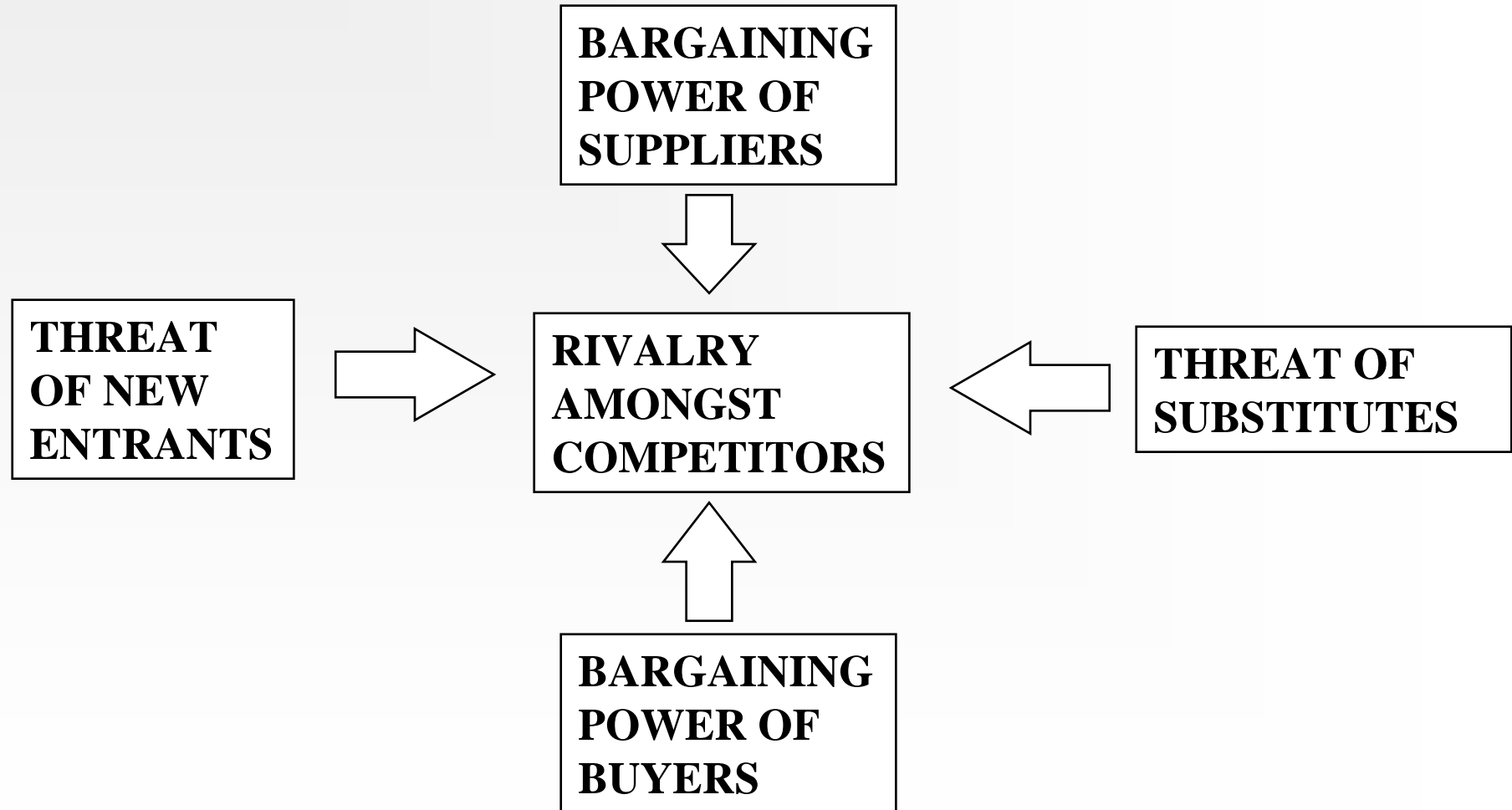
Questions for the Equity Investor

- How is this stock going to perform?
 - Any clear trends in company performance?
- Are trends sustainable? What could go wrong?
 - Firm's management
 - Competition
 - Industry restructure
- How does this firm make its money?
 - Is it efficient, well managed?
- How does it compare to competitors?
 - Common factors affecting all firms in this industry?
- How much of this is built into the share price?

Applications of FSA

- Analyzing trends
- Evaluating company performance
 - How is it generating profits?
 - How efficiently is it utilizing assets?
 - How risky a firm is it?
- Comparative analysis of competitors & industry
- Forecasting returns to shareholders

Industry Analysis - Porter's Five Forces Model



Threat of Entry

- Importance of barriers to entry:
 - Economies of scale
 - First mover cost advantages
 - Capital required
 - Government/legal barriers
 - Control of distribution
 - Product differentiation
- Higher the barriers, higher the profitability
- Example: Telecoms industry

Buyer Power

- Price sensitivity x Bargaining power
 - Cost of purchase vs total costs
 - Profitability of buyers
 - Size & concentration of buyers relative to suppliers
 - Buyers switching costs
 - Buyer's information
 - Ability to integrate backwards

- Example: Auto parts industry
 - Bargaining power of auto manufacturers reduces profitability of auto parts industry

Threat of Substitutes

- Willingness to substitute
- Price-performance of substitutes
- Example: frozen food industry
 - Prices limited by prices of canned & fresh foods

Competitor Rivalry

- Increase rivalry, lower profitability:
 - Low industry concentration
 - Slow demand growth
 - High fixed costs
 - Homogeneous goods
- Example: Chemicals industry

Case Study: ABC Grocery Co.

➤ Background

- Privately owned grocery store
- 139 food stores in Oregon & California
- 1,431,770 shares of common stock outstanding
- 78,031 (5.45%) are offered for sale
- You are retained by John Smith, prospective minority shareholder

➤ Objective:

- Value 5.45% ownership interest

➤ Follow using Excel

- Load spreadsheet: Fundam.xls

Industry Trends

➤ Firm Rivalry - High

- Mature industry
- Homogeneous goods

☞ Buyer Power - Rising

- ◆ Low bargaining power, *but*
- ◆ Increasing price sensitivity

◆ Threat from New Entrants/Substitutes - High

- ◆ Low barriers to entry
- ◆ Discount stores & Warehouse clubs

☞ Prospects:

- ◆ Lower sales growth
- ◆ Pressure on margins

☞ Strategy

- ◆ Focus on efficiency
- ◆ Market share

Financial Statements

- P&L
- Balance sheet
- Statement of Cashflows

P&L Statement

ABC Grocery Co.	1993	1992	1991	1990	1989
	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)
Revenues	1,628,251	1,526,509	1,440,023	1,348,304	1,183,979
Cost of Goods Sold	1,209,590	1,130,856	1,066,439	1,012,982	885,340
Gross Profit	418,661	395,653	373,584	335,322	298,639
Operating Expenses:					
<i>Selling, General & Admin.</i>	348,313	323,556	306,721	278,591	246,426
<i>Depreciation</i>	25,345	25,771	24,562	23,006	21,185
Total Operating Exp.	373,658	349,327	331,283	301,597	267,611
Operating Income	45,003	46,326	42,301	33,725	31,028
Nonoperating Income & expenses	18,438	18,762	13,910	14,220	10,971
EBIT	63,441	65,088	56,211	47,945	41,999
Interest Expense	10,587	10,121	8,842	8,763	8,186
NPBT	52,854	54,967	47,369	39,182	33,813
Provision for Income Tax	18,499	19,238	16,579	13,714	11,834
Net Income	34,355	35,729	30,790	25,468	21,979
Dividends	6,954	6,349	5,303	4,591	4,022
Retained Earnings	27,401	29,380	25,487	20,877	17,957

Balance Sheet

ABC Grocery Co.

1993

(\$000)

ASSETS

Current Assets:

<i>Cash & Equivalents</i>	21,609
<i>Investments</i>	1,850
<i>Accounts Receivable</i>	12,679
<i>Prepaid Expenses</i>	580
<i>Inventory</i>	<u>121,259</u>
Total Current Assets	<u>157,977</u>

Fixed Assets:

<i>Land</i>	17,114
<i>Buildings</i>	130,628
<i>Equipment & Fixtures</i>	196,485
<i>Transportation Equipment</i>	11,401
Total Fixed Assets; Cost	355,628
<i>Accumulated Deprn.</i>	<u>(166,851)</u>
Total Fixed Assets; Net	188,777
Leases, Deferred Taxes & Other Assets	<u>86,071</u>
TOTAL ASSETS	<u>432,825</u>

LIABILITIES & EQUITY

Liabilities:

Current Liabilities:

<i>Overdraft</i>	0
<i>Capital Leases</i>	4,293
<i>Trade Accounts Payable</i>	62,953
<i>Accounts Payable - Affiliates</i>	2,946
<i>Notes & Mortgages Payable</i>	1,298
<i>Income Taxes Payable</i>	2,780
<i>Accrued Expenses</i>	<u>44,572</u>
Total Current Liabilities	<u>118,842</u>

Long Term Debt:

<i>Notes & Mortgages Payable</i>	32,423
<i>Capital Leases</i>	<u>58,570</u>
Total Long Term Debt	90,993
<i>Other Debt</i>	<u>4,708</u>
Total Liabilities	<u>214,543</u>

Equity:

<i>Common Stock</i>	2,457
<i>Paid-in Capital</i>	263
<i>Retained Earnings</i>	221,075
<i>Treasury Stock</i>	<u>(5,513)</u>
Total Shareholder's Equity	<u>218,282</u>
TOTAL LIABILITIES & EQUITY	<u>432,825</u>

Financial Ratio Analysis

➤ Trends

- To assess future direction
- Comparison with industry

➤ Performance Ratios

- How efficiently a company is trading

➤ Financial Status Ratios

- Liquidity & Capital Structure
- Risk

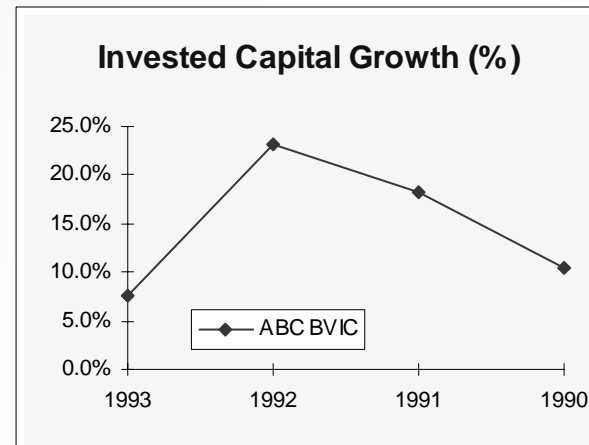
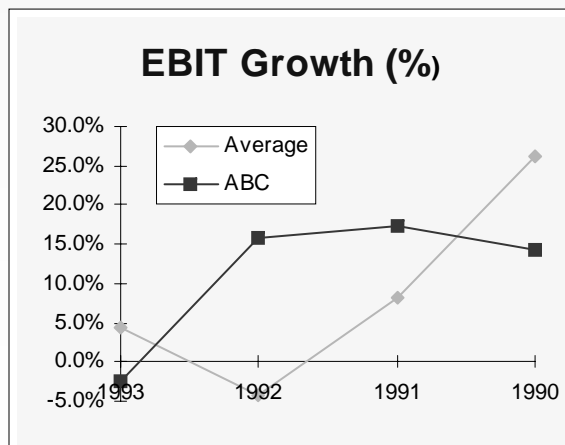
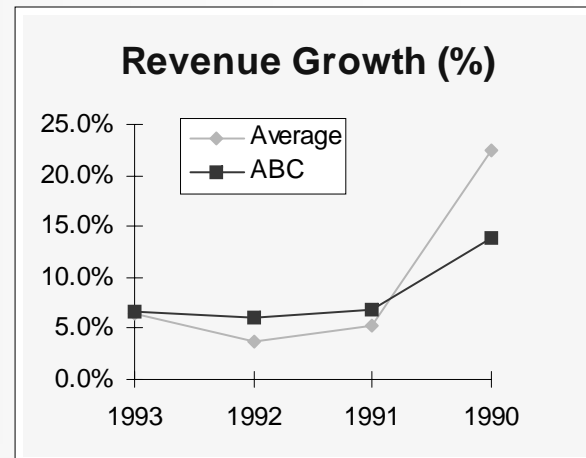
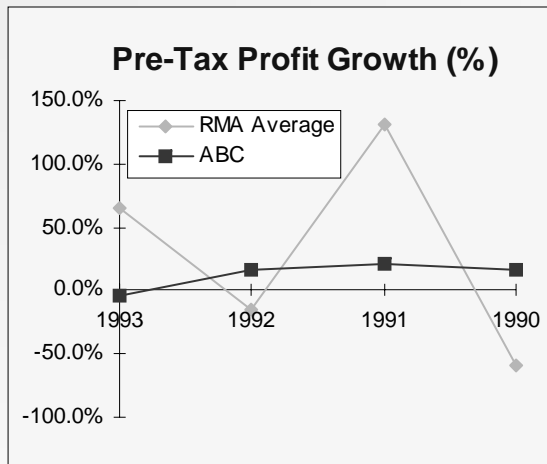
➤ Shareholder Returns

- Benefits to be gained by investing in shares

Trends

- Most useful trends include
 - Revenues
 - EBIT
 - Pre-Tax / Net Income
 - Invested Capital
 - Shareholders equity + LTD + STD
- Compare annual % changes with RPI and industry averages
- Look at compound growth rate & Coefficient of Variation: $CV = \frac{\sigma}{m} \times 100$

Trends: Charts

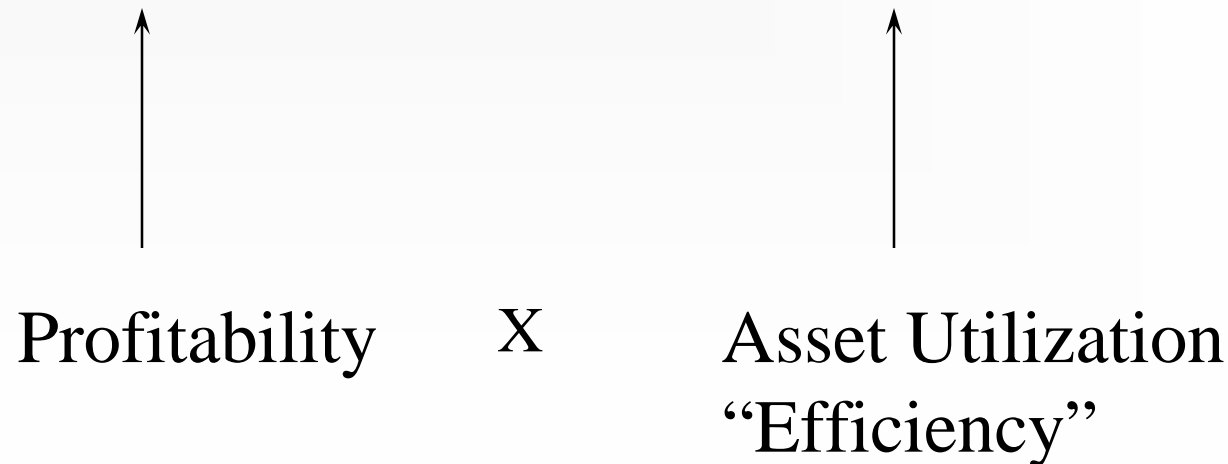


Performance Ratios: Dupont System

➤ $ROA = \frac{EBIT}{ASSETS}$

_____ = $\frac{EBIT}{SALES} \times \frac{SALES}{ASSETS}$

➤ $ROA = \text{Net Profit Margin} \times \text{Asset Turnover}$



ROA Calculation

	1993	1992
SALES	1,628.3	1,526.5
EBIT	63.4	65.1
ASSETS	432.8	408.5
ROA (EBIT/ASSETS) (65.1/408.5)		15.9%
NET MARGIN (EBIT/SALES)		4.3% (65.1/1526.5)
ASSET TURNOVER (SALES/ASSETS)		3.7 (1526.5/408.5)

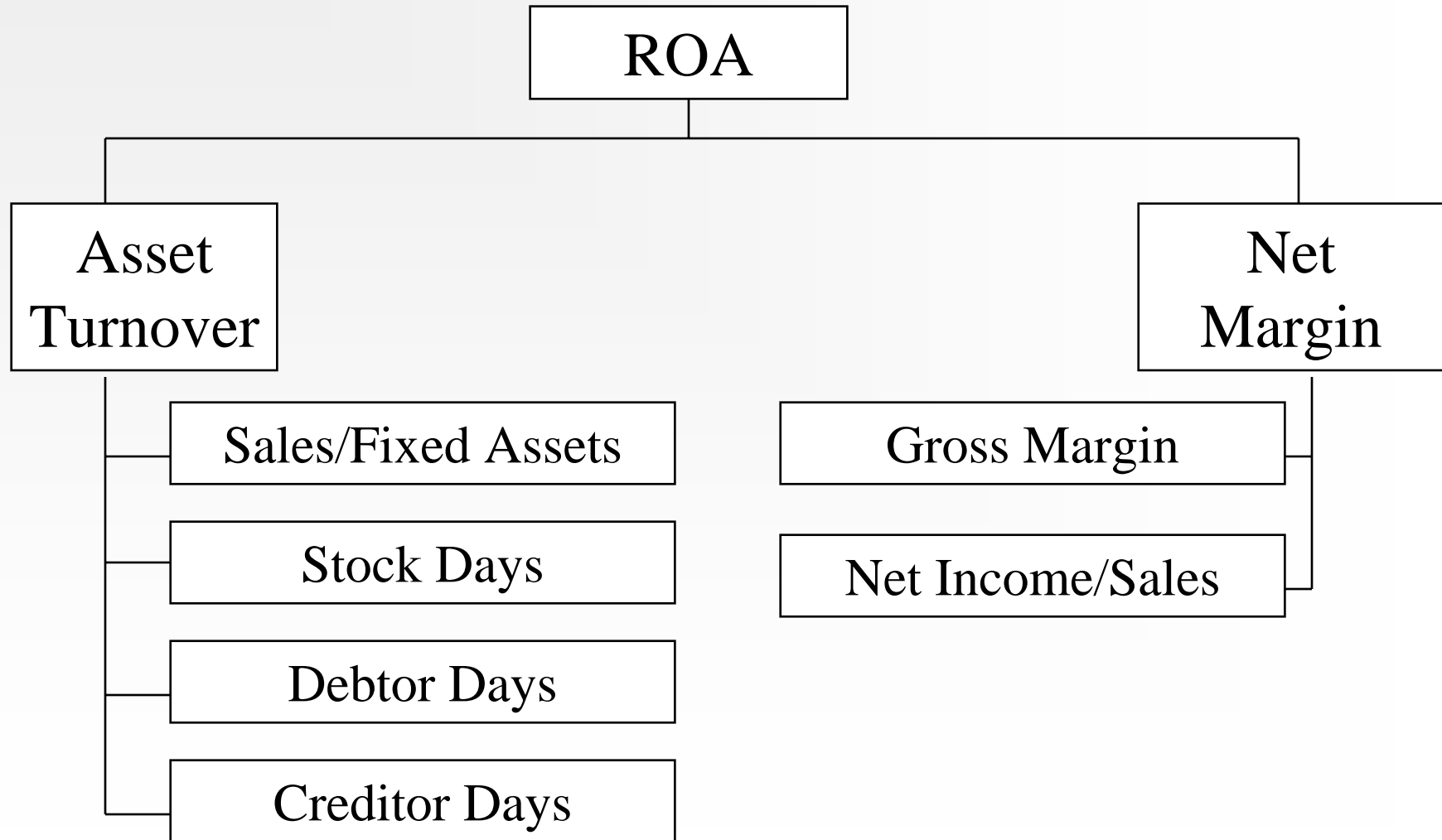
ROA Trend

	RMA	1993	1992
SALES		1,628.3	1,526.5
EBIT		63.4	65.1
ASSETS		432.8	408.5
ROA (EBIT/ASSETS)	13.7%	14.7%	15.9% (65.1/408.5)
NET MARGIN (EBIT/SALES)	3.9%	3.9%	4.3% (65.1/1526.5)
ASSET TURNOVER (SALES/ASSETS)	3.5	3.8	3.7 (1526.5/408.5)

ROA Analysis

- ROA is still above industry average
 - Higher margin
 - Better efficiency
- But ROA has declined in 1993 vs 1992
 - Due to falling margin
 - Despite improvement in efficiency
- Next: Get more detailed understanding

ROA Breakdown



Fixed Asset Turnover

- How many \$ sales generated by each \$1 invested in Fixed Assets
 - A decline usually means plant etc is ‘wearing out’

➤	<u>1992</u>
SALES	1,526.5
FIXED ASSETS	147.9
FIXED ASSET TURNOVER	10.3

Stock Turnover/Days

- How many days sales are held in stock
 - Rise in stock days could indicate slowdown in sales
 - Reducing stock days frees up working capital
 - But increases risk of stockout

➤ STOCK TURNOVER =	$\frac{\text{COST OF SALES}}{\text{INVENTORY}}$	
STOCK DAYS =	$\frac{\text{INVENTORY}}{\text{COST OF SALES}} \times 365$	
INVENTORY		$\frac{1992}{116.6}$
COST OF SALES		$1,130.9$
STOCK TURNOVER		9.7
STOCK DAYS		37.6

Debtor Turnover/Days

- How many days taken to collect debts
 - Rise in debtor days could indicate credit problems
 - Reducing debtor days frees up working capital
 - Why is debtor days so low here?

➤ DEBTOR TURNOVER =

$$\frac{\text{SALES}}{\text{TRADE DEBTORS}}$$
$$\text{DEBTOR DAYS} = \frac{\text{TRADE DEBTORS}}{\text{SALES}} \times 365$$

SALES

1992

1,526.5

TRADE DEBTORS (Accounts Receivable)

10.4

DEBTOR TURNOVER

146.8

DEBTOR DAYS

2.8

Creditor Turnover/Days

- How many days credit allowed by suppliers
 - Working capital financing at the expense of suppliers
 - Increasing creditor days adds to working capital
 - Fall in creditor days means suppliers are speeding collection

➤ CREDITOR TURNOVER = $\frac{\text{COST OF SALES}}{\text{TRADE CREDITORS}}$

CREDITOR DAYS = $\frac{\text{TRADE CREDITORS}}{\text{COST OF SALES}} \times 365$

	<u>1992</u>
COST OF SALES	1,130.9
TRADE CREDITORS (Accounts Payable)	67.0
CREDITOR TURNOVER	16.9
CREDITOR DAYS	21.6

Net Margin

- Mark-up of sales over operating costs
 - Decline may reflect fall in gross margin
 - Or, rise in operating costs (SGA)

➤ NET MARGIN = $\frac{\text{EBIT}}{\text{SALES}}$

EBIT

SALES

NET MARGIN

1992

65.1

1,526.5

4.3%

Gross Margin

- Mark-up of sales over direct costs
 - Usually first component to reflect price pressures
 - Fractions of % are significant because of knock-on effect

➤ GROSS MARGIN = $\frac{\text{GROSS PROFIT}}{\text{SALES}}$

	<u>1992</u>
GROSS PROFIT	395.6
SALES	1,526.5
GROSS MARGIN	25.9%

Net Income/Sales

- How many cents of each \$1 in sales are available for distribution to shareholders
 - As a shareholder want to see stability in this ratio
 - Reflects changes in gross margin, net margin, tax and financing costs



	<u>1992</u>
NET INCOME	35.7
SALES	1,526.5
GROSS MARGIN	2.3%

Lab: Performance Ratios

- Calculate ratios for 1993
- ROA has fallen due to decline in profitability:
 - Where is decline in profitability most evident?
 - What does this indicate?
- What trends do you see in asset utilization?
 - What does this indicate?
- Do these patterns fit what is happening in the industry?
 - What is your prognosis for the future?

Financial Status Ratios

- Business Risk
 - Operating Leverage
- Financial Risk
 - Financial Leverage
- Long Term Risk
 - Leverage
 - Interest Cover
- Short Term Liquidity Risk
 - Current Ratio
 - Acid Test

Operating Leverage

- Business risk is uncertainty of income due to:
 - Fluctuating sales
 - Level of fixed costs
- Firms with low fixed costs have low operating leverage
 - Their earnings fluctuate in line with sales
 - They have less volatile earnings & lower betas
- Firms with high fixed costs have high operating leverage
 - Their earnings fluctuate more than sales
 - This translates into higher beta

Operating Leverage: Example

➤ Firm A:

- High fixed costs
- High Operating Leverage
- Variable costs = 40% of sales

☞ Firm B:

- ◆ Low fixed costs
- ◆ Low Operating Leverage
- ◆ Variable costs = 60% of sales

Firm	Fixed Costs	Var. Costs	Fixed/ Total	-----Sales-----		
				\$125	\$200	\$80
A	\$50	\$50	0.5	\$25	\$70	-\$2
B	\$25	\$75	0.25	\$25	\$55	\$7

Operating Leverage Ratio

➤
$$\text{OP LEV} = \frac{\% \text{ Change in Operating Earnings}}{\% \text{ Change in Sales}}$$

Financial Leverage

- Reflects degree of fixed financial costs (interest)
 - Financial risk is additional to business risk
 - High financing costs = high financial leverage
 - Returns to equity holders more variable
- $\text{FIN LEV} = \frac{\% \text{ Change Net Income}}{\% \text{ Change in EBIT}}$
- ABC's FIN LEV ratio for 1993 was 1.5
 - A 1% change in operating income produces approximately a 1.5% change in income available to shareholders

Leverage

- The proportion of the company financed by debt
 - High leverage implies more volatile earnings, higher beta.

- $$\text{LEVERAGE} = \frac{\text{TOTAL DEBT}}{\text{TOTAL ASSETS}}$$

- Many different measures used:

$$\text{DEBT/EQUITY RATIO} = D/E$$

- Note: $L = D/A = D/(D+E)$; $D/E = L/(1-L)$

➤		<u>1992</u>
	TOTAL DEBT (Liabilities)	217.6
	TOTAL ASSETS	408.5
	LEVERAGE	0.53

Interest Cover

- How easily can the firm meet its interest obligations
 - Primarily of interest to long term debt-holders

- $$\text{INTEREST COVER} = \frac{\text{EBIT}}{\text{INTEREST EXP.}}$$

- | | |
|------------------|-------------|
| | <u>1992</u> |
| EBIT | 65.1 |
| INTEREST EXPENSE | 10.1 |
| INTEREST COVER | 6.4 |

Current Ratio

- Can firm meet short term liabilities on time?
- Old rule of thumb (2:1) not really valid
 - Compare to industry norms
 - Look for trends

➤
$$\text{CURRENT RATIO} = \frac{\text{CURRENT ASSETS}}{\text{CURRENT LIABILITIES}}$$

➤	<u>1992</u>
CURRENT ASSETS	171.5
CURRENT LIABILITIES	131.3
CURRENT RATIO	1.3

Acid Test (Quick) Ratio

➤ Stricter test of liquidity as inventory is excluded

➤ ACID TEST =

$$\frac{\text{CURRENT ASSETS} - \text{INVENTORY}}{\text{CURRENT LIABILITIES}}$$

	<u>1992</u>
CURRENT ASSETS	171.5
INVENTORY	116.6
CURRENT LIABILITIES	131.3
CURRENT RATIO	0.3

Lab: Financial Status Ratios

- Work out ABC's leverage and interest cover ratios for 1993
- Would you say it is a high or low leveraged firm?
- How do you rate its long term riskiness?
- Do you see any issues regarding liquidity?
 - What is the cause?
 - What are the possible solutions?

Shareholder Return Ratios

- Return on Equity
- Earnings Per Share
- P/E Ratio
- Payout Ratio
- Dividend Yield
- Price-Book Value

Return on Equity

➤ Key measure of returns to shareholder

➤
$$\text{ROE} = \frac{\text{NET INCOME}}{\text{SHAREHOLDER'S EQUITY}}$$

➤

	<u>1992</u>
NET INCOME	35.7
SHAREHOLDERS EQUITY	190.9
ROE	18.7%

Earnings Per Share

➤ Earnings attributable to ordinary shares

➤
$$\text{EPS} = \frac{\text{NET INCOME}}{\text{NO. SHARES}}$$

➤

	<u>1992</u>
NET INCOME	35.7
NO SHARES	1.43
EPS	\$24.96

Price Earnings Ratio

➤ Market's view of company's growth potential

➤
$$\text{P/E RATIO} = \frac{\text{SHARE PRICE}}{\text{EARNINGS PER SHARE}}$$

➤

EPS	<u>1992</u>
SHARE PRICE*	\$24.96
P/E RATIO	\$225
	9.0

➤ * In 1992, 25,000 shares were sold privately for \$5,625,000

Payout Ratio

➤ Proportion of profits paid out as dividends

➤
$$\text{PAYOUT RATIO} = \frac{\text{DIVIDEND}}{\text{NET INCOME}}$$

➤	<u>1992</u>
DIVIDENDS	6.35
NET INCOME	35.7
PAYOUT RATIO	17.8%
➤ PLOUGHBACK RATIO	
= (1 - PAYOUT RATIO)	82.2%

Dividend Yield

- Yield income to shareholders
- $\text{DIVIDEND YIELD} = \frac{\text{DIVIDEND PER SHARE}}{\text{SHARE PRICE}}$

- | | |
|---------------------|-------------|
| | <u>1992</u> |
| DIVIDENDS PER SHARE | \$4.43 |
| SHARE PRICE | \$225 |
| DIVIDEND YIELD | 1.97% |

Price-Book Value

➤ Degree to which market value of equity exceeds book value

➤ P-B RATIO = $\frac{\text{SHARE PRICE}}{\text{PER SHARE BOOK VALUE}}$

➤

SHARE PRICE	<u>1992</u>
PER SHARE BOOK VALUE	\$225
P-B RATIO	\$133
	1.69

ROE - The Dupont System

➤ $ROE = \frac{NET\ INCOME}{EQUITY}$

➤ $ROE = \frac{NET\ INCOME}{SALES} \times \frac{SALES}{ASSETS} \times \frac{ASSETS}{EQUITY}$

➤ $ROE = Profitability \times Asset\ Turnover \times Leverage$

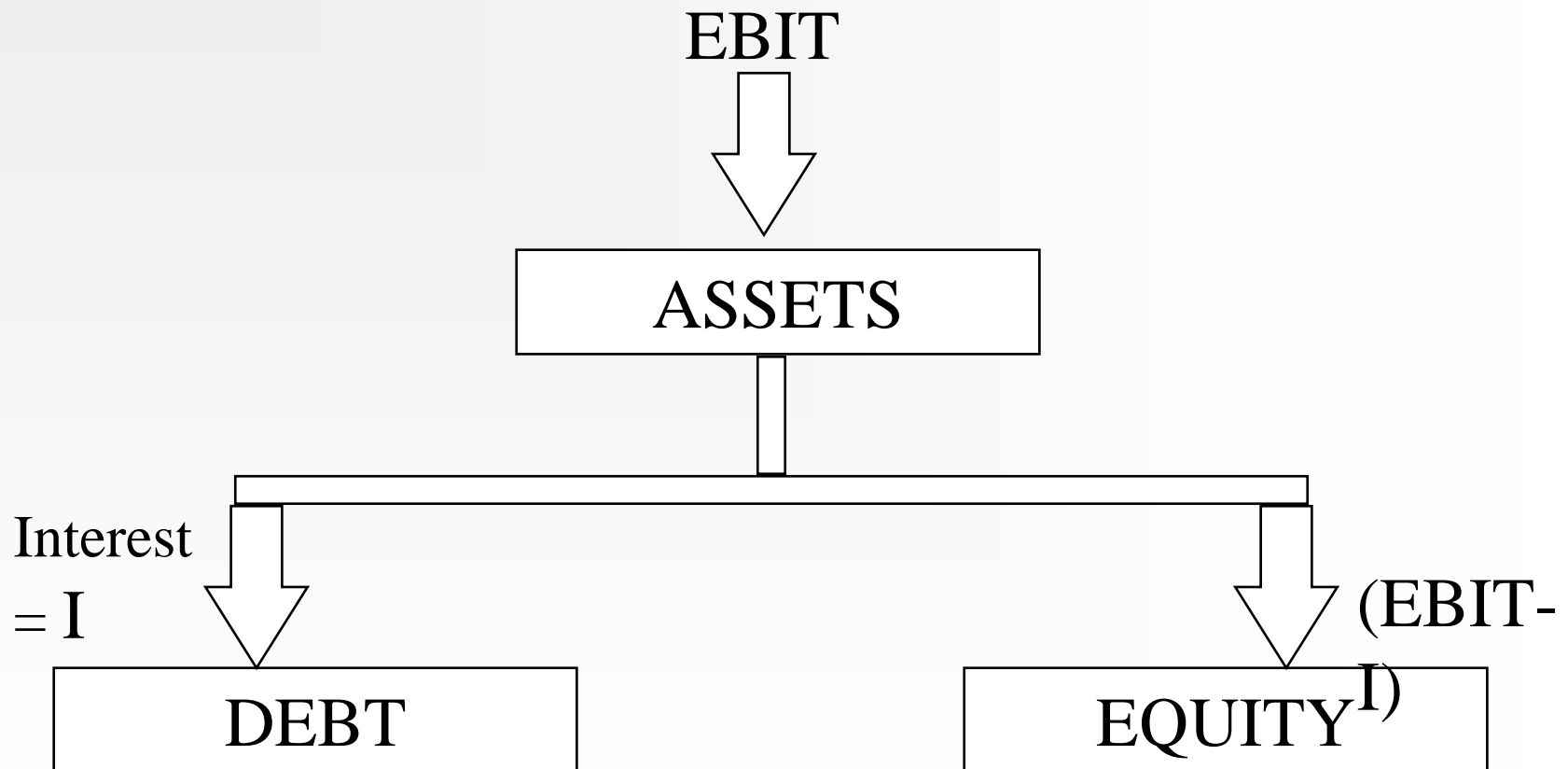
➤ 1992 2.34% x 3.74 x 2.14 = 18.7%

1993 2.11% x 3.76 x 1.98 = 15.7%

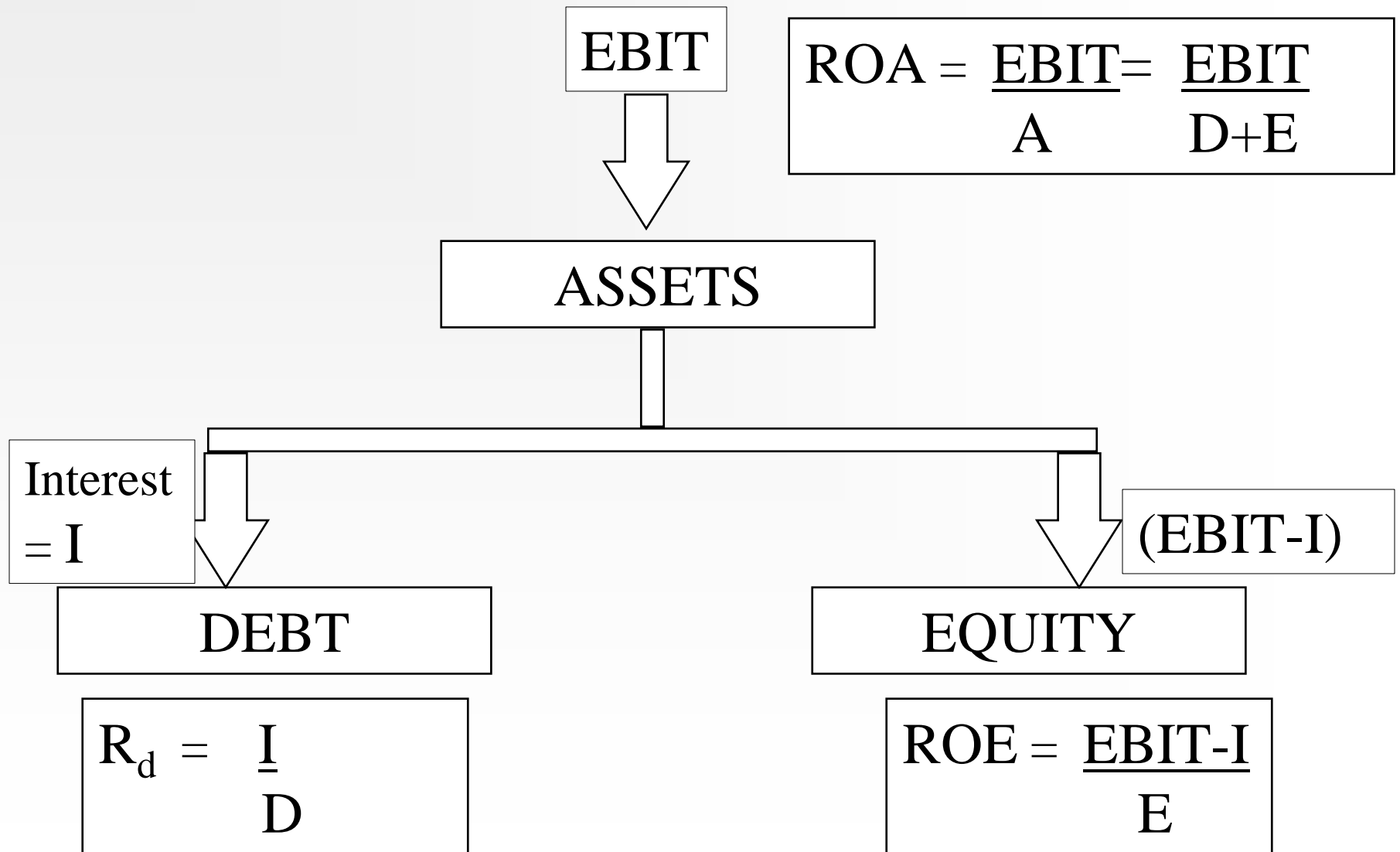
ROE: Conclusions

- ROE has declined significantly in 1993 due to:
 - Decline in profitability
 - Fall in leverage
 - Despite small improvement in ATO
- Decline in Profitability:
 - Fall in gross margin
 - Rise in operating costs (SG&A)
- Leverage?

Returns to Investors: (no taxes)



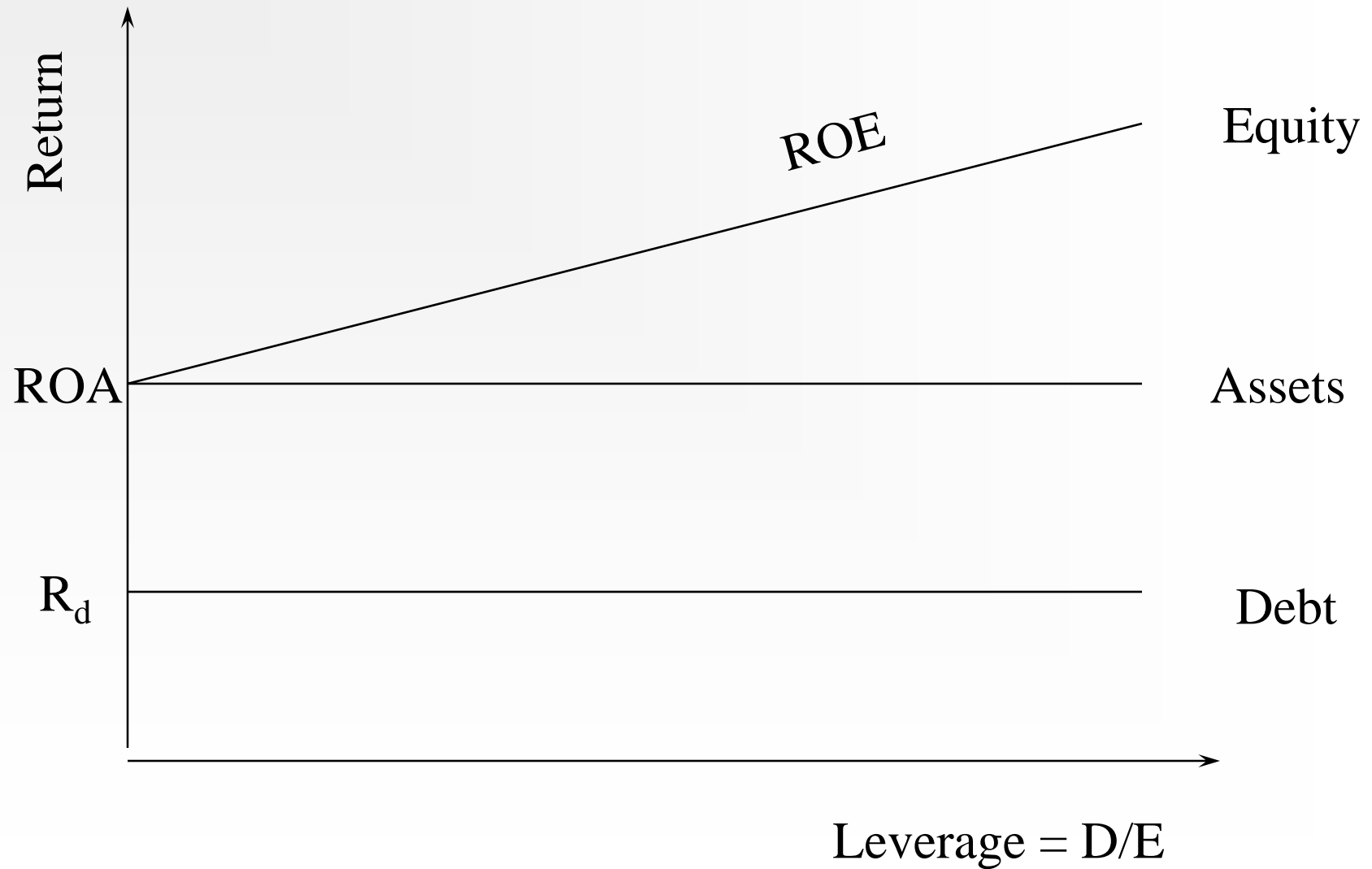
Returns to Investors: (no taxes)



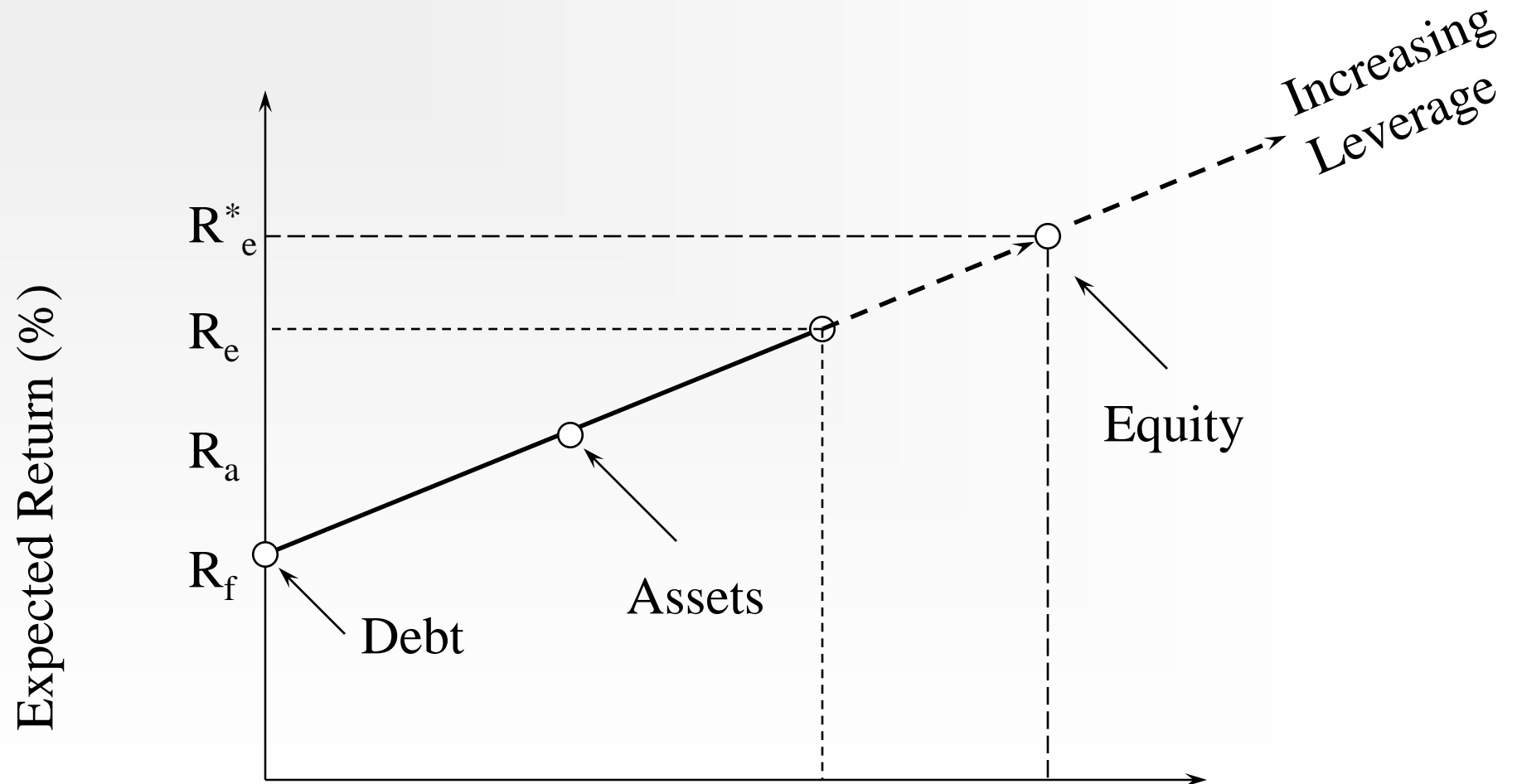
Leverage & ROE

- Does leverage affect ROE? - YES!
 - Shareholders get paid *after* debt-holders
 - Risk that there may not be enough EBIT remaining after debt-holders get paid
 - Risk increases as Debt (leverage) increases
 - So required returns (ROE) increase
- ROE increases linearly with leverage:
- $$\text{ROE} = \text{ROA} + \frac{\text{D}}{\text{E}} (\text{ROA} - \frac{\text{I}}{\text{D}})$$

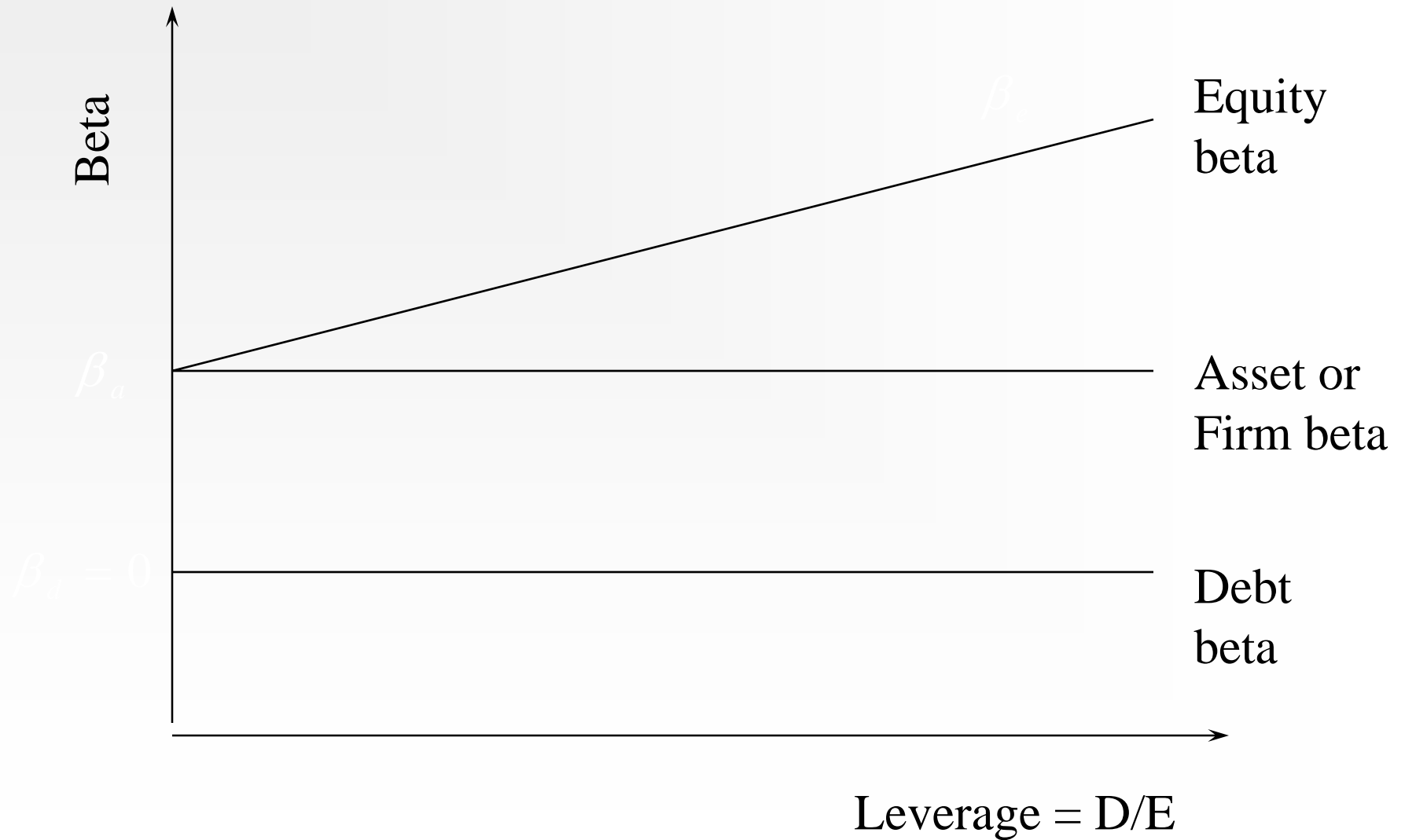
Leverage & ROE Relationship



Leverage & CAPM



Leverage & Beta



ABC: The Story So Far

- Profitability historically above industry average
- BUT: Competition is intensifying
- Recent decline has set in
 - Margins
 - Leverage
 - ROE and ROA
- Also, upgrading of fixed assets is indicated

Valuation in The ABC Case

- Valuation Premise: Going concern
- Valuation Purpose: Private equity investment
- Valuation Standard: Intrinsic value
- Valuation object: Equity
- Fundamental Valuation Method
 - Guideline company method

Guideline Company Method

- Select publicly-traded guideline companies
- Work out value of equity as multiple of e.g. earnings
- Multiply ABC's earnings by average multiple
 - Gives estimated value of equity

Guideline Company Selection

- Select publicly-traded guideline companies
 - Same industry, similar products & markets
 - Similar size in revenues, earnings & book value
 - Comparable management experience
 - Similar capital structure, credit rating

Multiples

- Equity Multiples: Equity Value as Multiple of:
 - Earnings (P/E ratio)
 - Book value (P-B ratio)
 - Sales
- MVIC Multiples: MVIC Value as Multiple of:
 - Sales
 - EBIT
- Note: This will provide estimate of ABC's MVIC. To get equity estimator, subtract market value of debt.

Estimating Multiples

- Regression estimate - best method
 - Measures 'reliability' of multiple as a predictor of MVE
 - Provides confidence range for MVE prediction
 - Requires adequate number of guideline firms
- Median of guideline company multiples
 - Use for very small samples
 - Or where regression fit is poor
 - Not so influenced by extreme cases as mean
- Average of guideline company multiples
 - Can be influenced by extreme cases
 - Use harmonic mean

Multiples: The Regression Method

➤ Regression: $Y = a + bX + e$

- Y is variable you want to predict - e.g. market value of equity
- X is “explanatory” variable - e.g. earnings
- b is the multiple to be estimated - e.g. P/E ratio
- a is typically insignificant and presumed = 0
- e is error term: $\sim \text{iid No}(0, \sigma^2)$

Regression Example

- $MVE = b_{PE} \times \text{Net Income} + e$
- Regression will provide ‘best’ estimate of b_{PE}
 - Estimate ABC’s $MVE = b_{PE} \times \text{Net Income}$
 - R^2 - “goodness of fit”: how much of variation is explained by independent variables

Regression in MS-Excel

P/E Multiple	Net Income (\$MM)	MV Equity (\$MM)	Pr MV (\$MM)
Brunos Inc	46.0	819.7	
Delchamps Inc	14.5	161.8	
Eagle Food Centers Inc	8.7	68.7	
Hannaford Brothers Co	49.6	951.5	
Ingles Markets Inc	11.4	158.9	
Penn Traffic Company	5.6	419.8	
Riser Foods Inc	6.6	71.7	
Smith's Food & Drug Centre	53.0	597.3	
Village Super Markets	1.4	28.4	
Weiss Markets Inc	72.2	1,226.5	
ABC	34.4		

SUMMARY OUTPUT	
<i>Regression Statistics</i>	
Multiple R	0.93
R Square	0.87

Regression

Input

Input Y Range:

Input X Range:

Labels Constant is Zero

Confidence Level %

Output options

Output Range:

New Worksheet Ply:

New Workbook

Residuals

Residuals Residual Plots

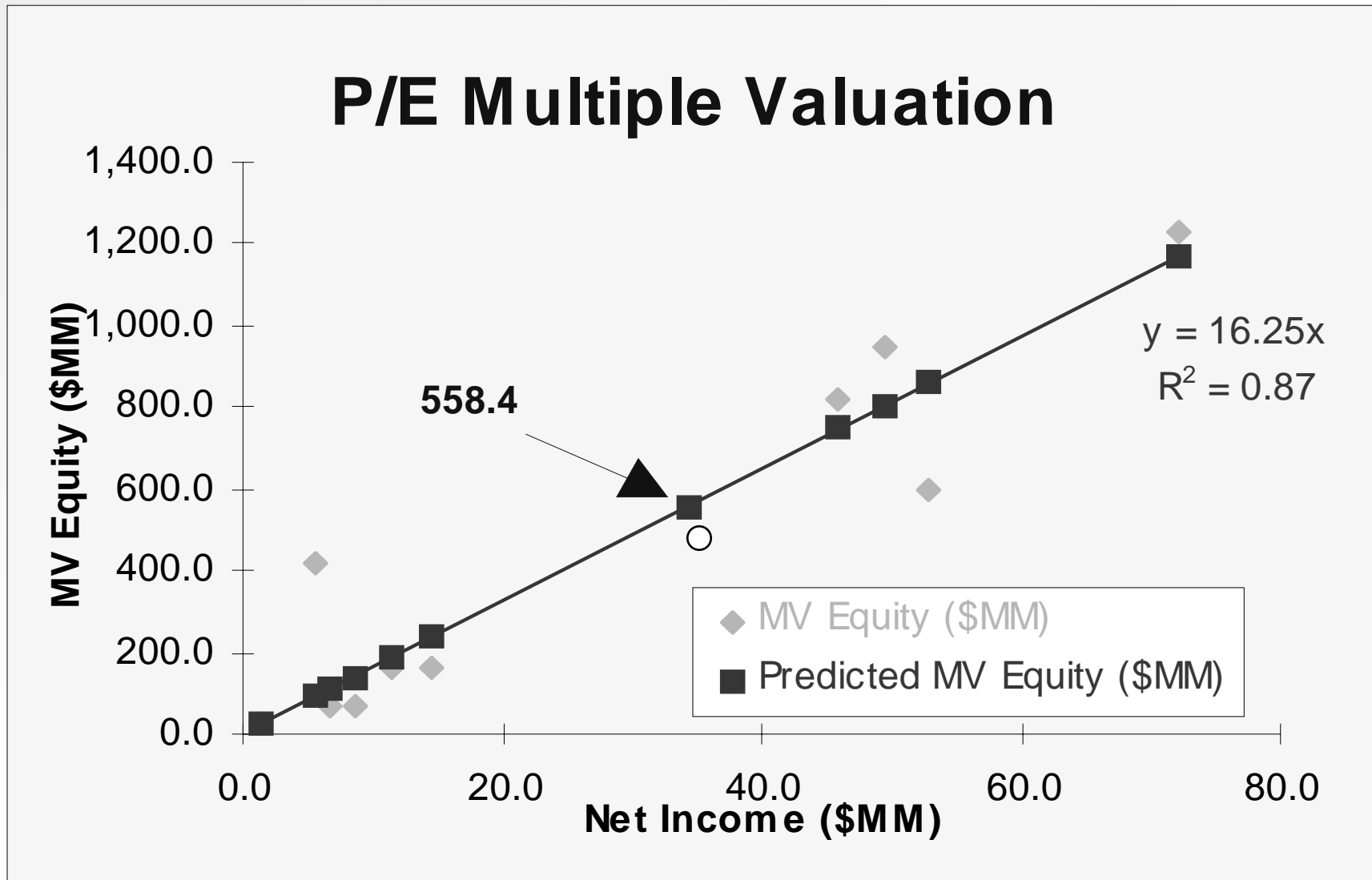
Standardized Residuals Line Fit Plots

Normal Probability

Normal Probability Plots

OK Cancel Help

ABC P/E Ratio Regression



Regression Sums of Squares

➤ Sums of Squares

- Due to Regression = SSR

$$SSR = \sum (\hat{y} - \bar{y})^2$$

- Due to Error = SSE

$$SSE = \sum (y_i - \hat{y}_i)^2$$

- Total Sums of Squares = SST = SSR + SSE

$$SST = \sum (y_i - \bar{y})^2$$

Regression and ANOVA

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Square	F
Regression	SSR	m	MSR=SSR/m	F=MSR/MSE
Error	SSE	n-m-1	MSE=SSE/(n-m)	
Total	SST	n-1		

- F test statistic = MSR/MSE
 - With 1 and n-m-1 degrees of freedom
 - n is #observations, m is #parameters
 - Large value indicates relationship is statistically significant
- Coefficient of Determination
 - $R^2 = SSR/SST$
 - How much of total variation is explained by regression

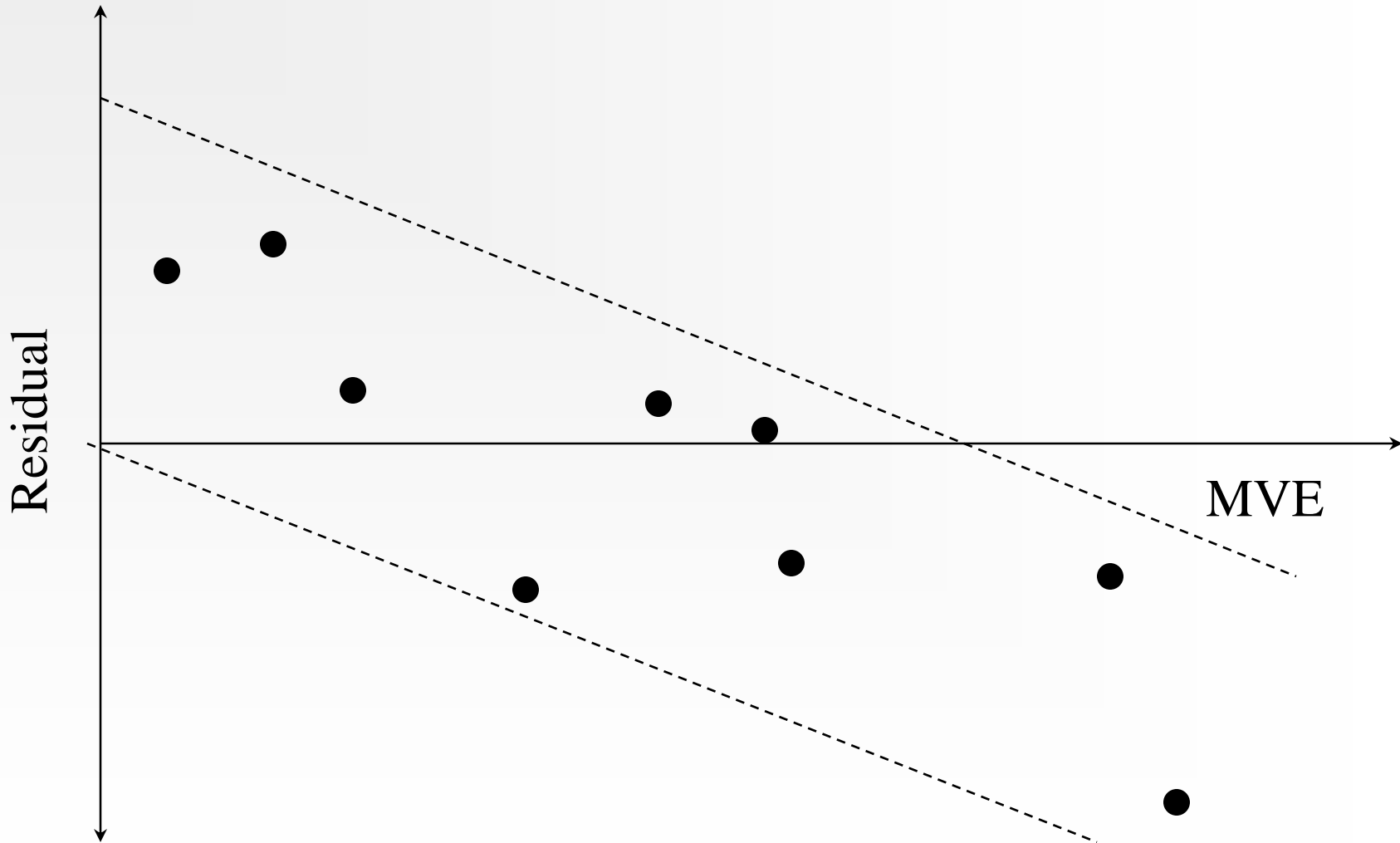
Residuals

- You need to check residuals: $E_i = (Y_i - Y_i^*)$
 - Residual = Actual MVE - Predicted MVE
- Residual Plot: Residual vs. Actual MVE
 - Residual plot should be random scatter around zero
 - If not, it implies poor fit, confidence intervals invalid
 - However, estimates are still the best we can achieve, but we can't say how good they are likely to be.
- Test for:
 - Non-Normality of residuals
 - Bias: non-zero mean
 - Heteroscedasticity (non-constant variance)

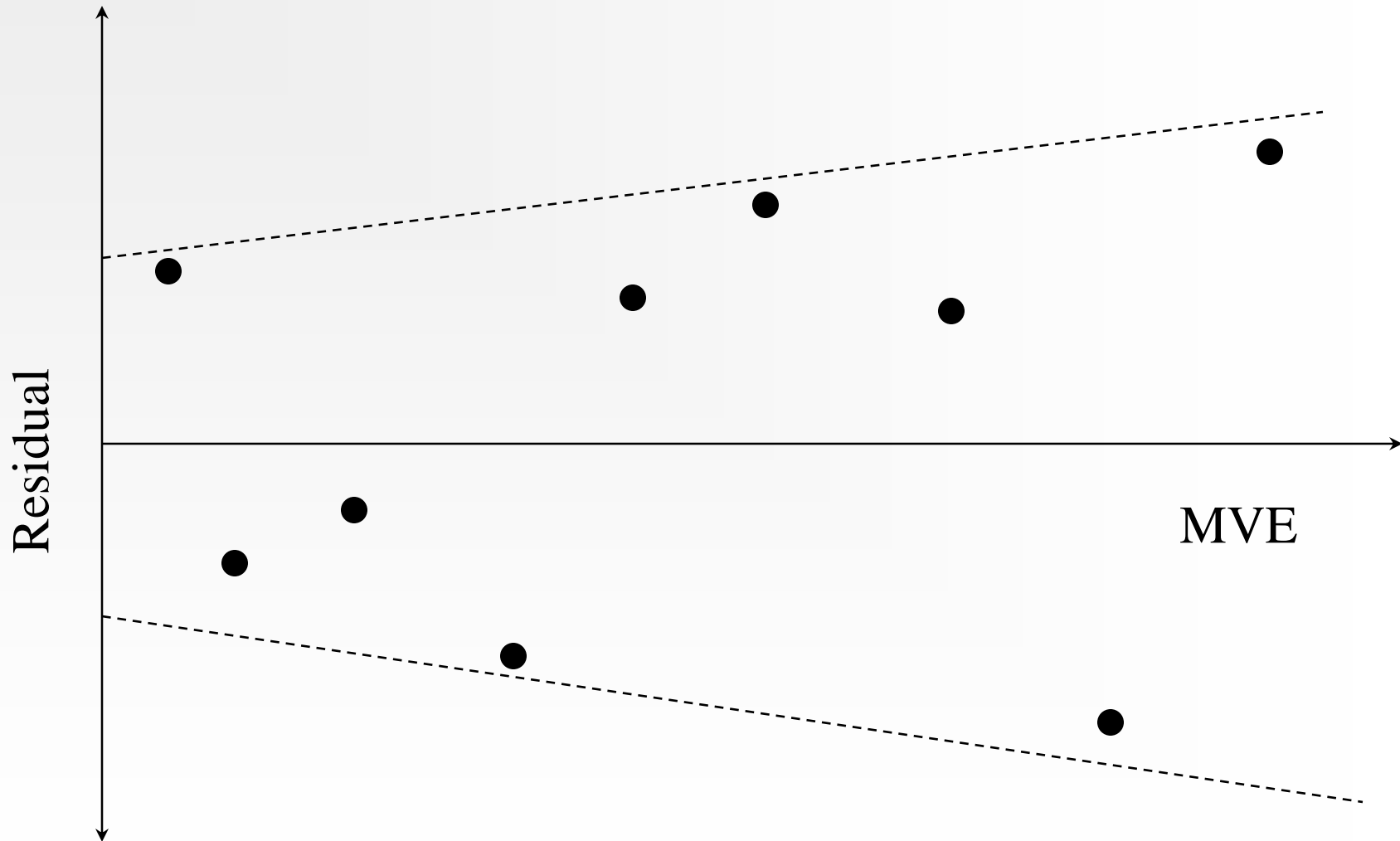
Residual Plot



Residual Plot - Bias



Residual Plot - Heteroscedasticity



Confidence Intervals

- Sample MVE is an *unbiased estimate* of the ‘true’ discount factor MVE_{TRUE}
- Confidence interval: 95% certain that:
 - $MVE_{\text{LOWER}} < MVE_{\text{TRUE}} < MVE_{\text{UPPER}}$
 - We can estimate this range from regression model, provided assumptions hold

Confidence Interval Estimation

- $MVE_{EST} \pm t_{\alpha/2} S^*$
 - Degrees of freedom = $n-p$
 - $n = \#$ observations
 - $p = \#$ parameters
 - For 95% confidence interval α is 5%
 - S^* is standard deviation of individual estimate

$$S^* = S \sqrt{1 + \frac{1}{n} + \frac{(x_p - \bar{x})^2}{\sum x_i^2 - (\sum x_i)^2 / n}}$$

$S =$ Standard error of the estimate $(MSE)^{1/2}$

Confidence Intervals for PE Multiple

P/E Multiple	Net Income (\$MM)	MV Equity (\$MM)	Predicted MV Equity (\$MM)	95% Lower Value (\$MM)	95% Upper Value (\$MM)
Brunos Inc	46.0	819.7	747.0	365.7	889.4
Delchamps Inc	14.5	161.8	235.4	-140.0	361.1
Eagle Food Centers Inc	8.7	68.7	140.6	-239.8	280.7
Hannaford Brothers Co	49.6	951.5	806.0	420.4	959.3
Ingles Markets Inc	11.4	158.9	185.6	-192.2	318.4
Penn Traffic Company	5.6	419.8	90.6	-293.2	239.7
Riser Foods Inc	6.6	71.7	108.1	-274.5	253.9
Smith's Food & Drug Centre	53.0	597.3	861.4	471.3	1,026.0
Village Super Markets	1.4	28.4	23.2	-366.0	185.6
Weiss Markets Inc	72.2	1,226.5	1173.5	747.4	1,410.9
ABC	34.4		558.4	185.8	675.5

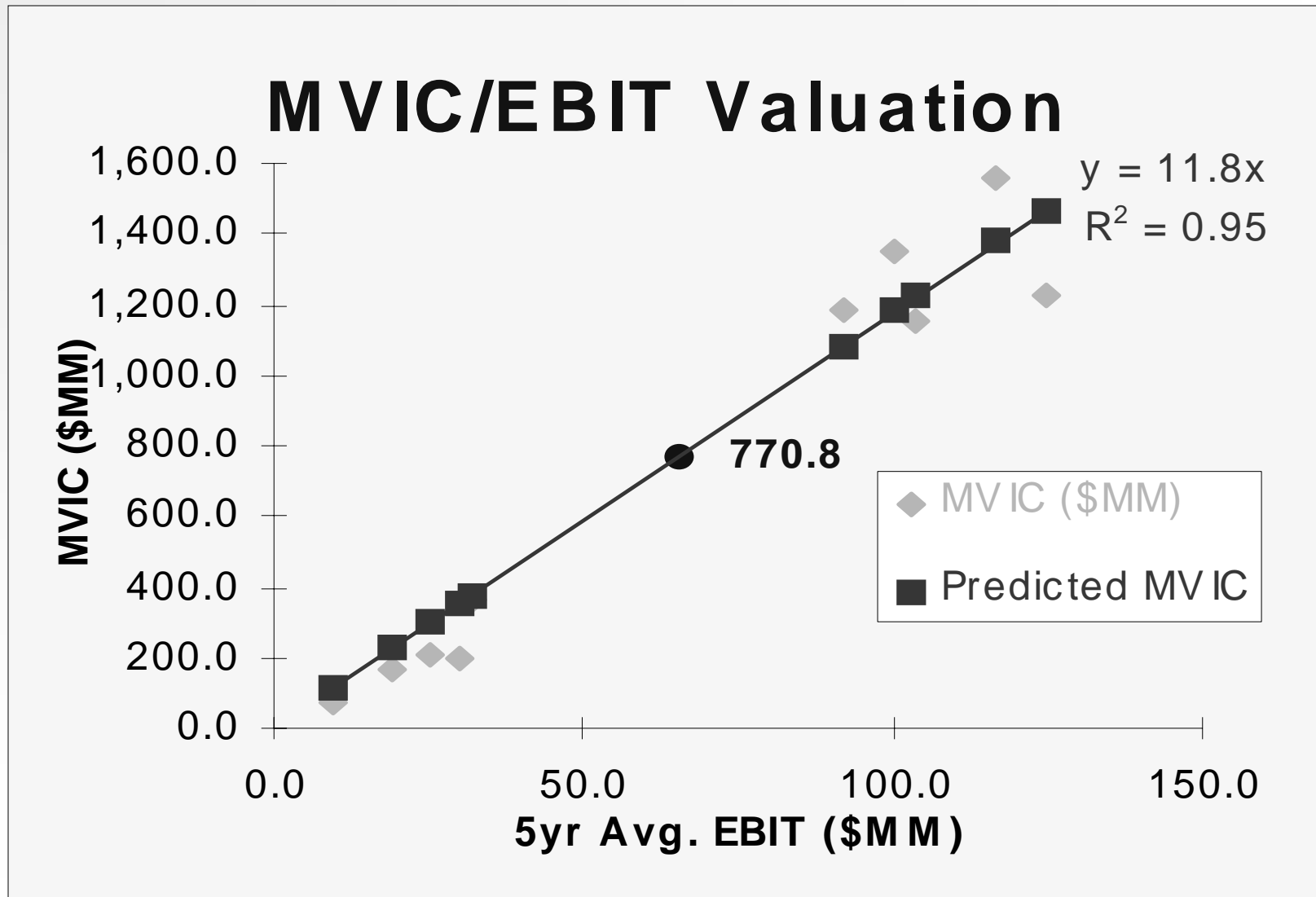
Lab: P-B Ratio Regression for ABC

- Perform regression analysis: $MVE = b_{PB} \times BVE + e$
- In Excel:
 - Choose Tools: Data analysis: Regression
 - Selection linear regression
 - Set intercept to zero
 - Residual plots
 - Line fir plots
- How reliable is the P-B ratio vs the P-E ratio
 - Look at the R^2
- Produce an Estimate of MVE for ABC

Regression for MVIC Multiples

- Similar procedure:
- Regress MVIC on e.g. Sales
- Estimate multiple
- Produce estimate of ABC's MVIC
- Now subtract Debt to get MVE

MVIC / EBIT Multiple Regression



MVIC Valuations

	MVIC/ SALES	MVIC/ EBIT
Estimated MVIC	798.3	770.8
Less: Debt	96.6	96.6
Estimated MV Equity	701.7	674.2

Summary of Valuations: Guideline

Company Method

➤ Method	MVE (\$MM)	Share Price(\$)	Weight
P/E Ratio	558.4	390.0	25%
Price/Book Ratio	384.0	268.2	25%
MVIC/EBIT Ratio	674.2	470.8	30%
MVIC/Sales	701.7	490.0	20%
Overall Estimate	578.2	\$403.8	
➤ <u>Indicated Share Value</u>		<u>\$403.8 per share</u>	