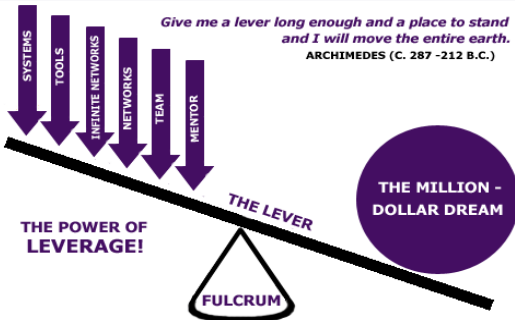


Chapter 13 Lecture - Leverage and Capital Structure

Chapter 13 Lecture - Leverage and Capital Structure



Capital Structure

- **Capital structure** = percent of debt and equity used to fund the firm's assets
 - “Leverage” = use of debt in capital structure
- **Capital restructuring** = changing the amount of leverage without changing the firm's assets
 - Increase leverage by issuing debt and repurchasing outstanding shares
 - Decrease leverage by issuing new shares and retiring outstanding debt

13-2

Capital Structure & Shareholder Wealth

- **The primary goal of financial managers:**
 - Maximize stockholder wealth
- **Maximizing shareholder wealth =**
 - Maximizing firm value
 - Minimizing WACC
- **Objective: Choose the capital structure that will minimize WACC and maximize stockholder wealth**

13-3

Business Risk versus Financial Risk

- **Business risk:**
 - Uncertainty in future EBIT.
 - Depends on business factors such as competition, operating leverage, etc.
- **Financial risk:**
 - Additional business risk concentrated on common stockholders when financial leverage is used.
 - Depends on the amount of debt and preferred stock financing.

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Chapter 13 Lecture - Leverage and Capital Structure

Business Risk

- The variability or uncertainty of a firm's operating income (EBIT).

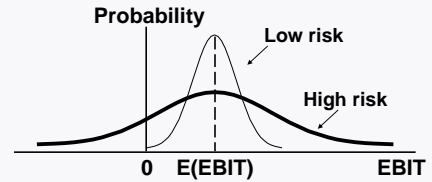


Affected by:

- Sales volume variability
- Competition
- Cost variability
- Product
- Diversification
- Product demand
- Operating Leverage

13-5

Business Risk: Uncertainty about Future Pre-tax Operating Income (EBIT)



Note that business risk focuses on operating income, so it ignores financing effects.

13-6

Financial Risk

- The variability or uncertainty of a firm's earnings per share (EPS) and the increased probability of insolvency that arises when a firm uses **financial leverage**.

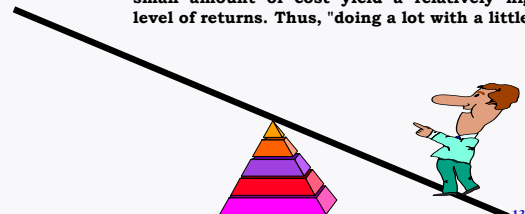


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So What Exactly is Leverage?



Ability to influence a system, or an environment, in a way that multiplies the outcome of one's efforts without a corresponding increase in the consumption of resources. In other words, leverage is an advantageous-condition of having a relatively small amount of cost yield a relatively high level of returns. Thus, "doing a lot with a little."



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Chapter 13 Lecture - Leverage and Capital Structure

What is Leverage in Business?

- Remember it is the use of special forces and effects to magnify or produce more than the normal results from a given course of action
- Leverage involves using fixed costs to magnify the potential return to a firm
 - Can produce beneficial results in favorable conditions
 - Can produce highly negative results in unfavorable conditions

13-9

Leverage in a Business

- Determining type of fixed operational costs
 - Plant and equipment
 - Can reduce expensive labor in production of inventory
 - Expensive labor
 - Lessens opportunity for profit but reduces risk exposure
- Determining type of fixed financial costs
 - Debt financing
 - Can produce substantial profits, but failure to meet contractual obligations can result in bankruptcy
 - Selling equity
 - May reduce potential profits for existing shareholders, but reduces their risk exposure

13-10

Two Concepts that Enhance Understanding of Risk

- 1) **Operating Leverage** - affects a firm's *business risk*.
 - The use of **fixed operating costs** as opposed to **variable operating costs**.
 - A firm with relatively high fixed operating costs will experience more **variable operating income** if sales change.
- 2) **Financial Leverage** - affects a firm's *financial risk*.
 - The use of **fixed-cost sources of financing** (debt, preferred stock) rather than **variable-cost sources** (common stock).

13-11

Operating Leverage and the Break-Even (Quantity) Point

Break-Even Point - The sales volume required so that total revenues and total costs are equal; may be in units or in sales dollars

How to find the quantity break-even point:

P = Price per unit **AVC** = Variable costs per unit
TFC = Fixed costs **Q** = Quantity (units) produced and sold

$$\text{EBIT} = \text{TR} - \text{TC} = \text{PQ} - \text{AVC}(\text{Q}) - \text{TFC}$$
$$\text{EBIT} = (\text{P} - \text{AVC})\text{Q} - \text{TFC}$$

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Chapter 13 Lecture - Leverage and Capital Structure

Break-Even (Quantity) Point

Breakeven occurs when $EBIT = 0$

$$EBIT = (P - AVC) Q - TFC = 0$$

$$(P - AVC) Q_{BE} - TFC = 0$$

$$(P - AVC) Q_{BE} = TFC$$

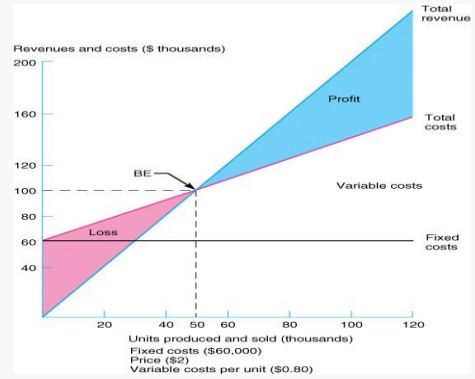
$$Q_{BE} = TFC / (P - AVC)$$

a.k.a. *Unit Contribution Margin*

- A leveraged firm has a high BE point
- A non-leveraged firm has a low BE point

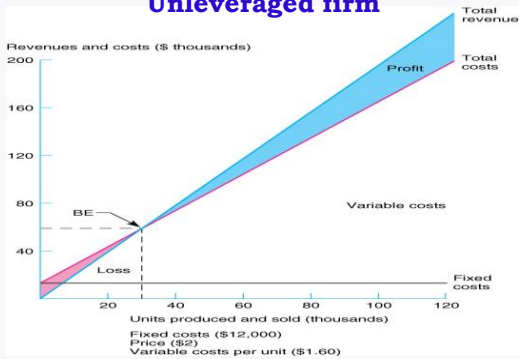
13-13

Break-Even Chart: Leveraged firm



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Break-Even Chart: Conservative or Unleveraged firm



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Volume-Cost-Profit Analysis: Leveraged Firm

Units Sold	Total Variable Costs	Fixed Costs	Total Costs	Total Revenue	operating Income (loss)
0	0	\$60,000	\$60,000	0	\$(60,000)
20,000	\$16,000	60,000	76,000	\$40,000	(36,000)
40,000	32,000	60,000	92,000	80,000	(12,000)
50,000	40,000	60,000	100,000	100,000	0
60,000	48,000	60,000	108,000	120,000	12,000
80,000	64,000	60,000	124,000	160,000	36,000
100,000	80,000	60,000	140,000	200,000	60,000

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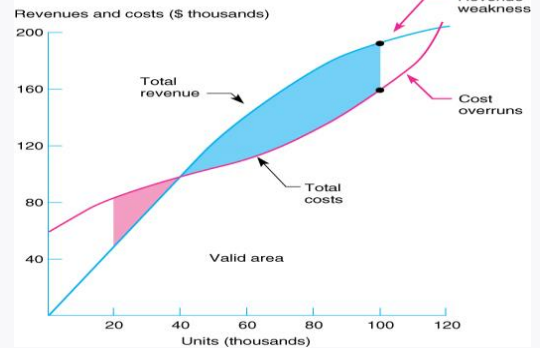
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Volume-Cost-Profit Analysis: Conservative or Unleveraged Firm

Units Sold	Total Variable Costs	Fixed Costs	Total Costs	Total Revenue	Operating Income (loss)
0	0	\$12,000	\$12,000	0	\$(12,000)
20,000	\$32,000	12,000	44,000	\$40,000	(4,000)
30,000	48,000	12,000	60,000	60,000	0
40,000	64,000	12,000	76,000	80,000	4,000
60,000	96,000	12,000	108,000	120,000	12,000
80,000	128,000	12,000	140,000	160,000	20,000
100,000	160,000	12,000	172,000	200,000	28,000

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Nonlinear Break-Even Analysis



13-18

Degree of Operating Leverage (DOL)

- Measure of the amount of fixed operating costs used by a firm.
- Operating leverage amplifies changes in sales volume into larger changes in EBIT
- **Degree of Operating Leverage (DOL) = %Δ in EBIT (or Operating Income) / % Δ in Sales**

$$DOL = Q(P-AVC) / (Q(P-AVC) - TFC)$$

- Operating Leverage measures the sensitivity of a firm's operating income to a Δ in sales.

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Operating Income or Loss

Units	Leveraged Firm	Conservative Firm
0	\$(60,000)	\$(12,000)
20,000	(36,000)	(4,000)
40,000	(12,000)	4,000
60,000	12,000	12,000
80,000	36,000	20,000
100,000	60,000	28,000

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Computing the DOL - Leveraged Firm

Units Sold	Total Variable Costs	Fixed Costs	Total Costs	Total Revenue	operating Income (loss)
0	0	\$60,000	\$ 60,000	0	\$(60,000)
20,000	\$16,000	60,000	76,000	\$ 40,000	(36,000)
40,000	32,000	60,000	92,000	80,000	(12,000)
50,000	40,000	60,000	100,000	100,000	0
60,000	48,000	60,000	108,000	120,000	12,000
80,000	64,000	60,000	124,000	160,000	36,000
100,000	80,000	60,000	140,000	200,000	60,000

Unit Sales	Operating Income	% Change Sales	% Change in Operating Income	DOL
40000	-12000			
50000	0	0.25	Infinite	Infinite
60000	12000	0.2	2	10
80000	36000	0.333333333	0.666666667	2
100000	60000			

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Computing the DOL - Conservative Firm

Units Sold	Total Variable Costs	Fixed Costs	Total Costs	Total Revenue	operating Income (loss)
0	0	\$12,000	\$ 12,000	0	\$(12,000)
20,000	\$ 32,000	12,000	44,000	\$ 40,000	(4,000)
30,000	48,000	12,000	60,000	60,000	0
40,000	64,000	12,000	76,000	80,000	4,000
60,000	96,000	12,000	108,000	120,000	12,000
80,000	128,000	12,000	140,000	160,000	20,000
100,000	160,000	12,000	172,000	200,000	28,000

Unit Sales	Operating Income	% Change Sales	% Change in Operating Income	DOL
30000	0			
40000	4000	0.333333333	2	6
60000	12000	0.5	0.666666667	1.33
80000	20000	0.333333333	0.4	1.2
100000	28000			

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Interpretation of the DOL

- DOL is a quantitative measure of the "sensitivity" of a firm's operating profit to a change in the firm's sales.
- The closer that a firm operates to its break-even point, the higher is the absolute value of its DOL.
- When comparing firms, the firm with the highest DOL is the firm that will be most "sensitive" to a change in sales.
- DOL is only **one component** of business risk and becomes "active" only in the presence of sales and production cost variability.
- DOL **magnifies** the variability of operating profits and, hence, business risk.

13-23

Financial Leverage

- "Financial leverage" = the use of debt
- Leverage amplifies the variation in both EPS and ROE
- We will ignore the effect of taxes at this stage
- We look at what happens to EPS and ROE when we issue debt and buy back shares of stock?
- The use of borrowed money incurs interest, which is like a fixed cost
- If returns are greater than the interest rate then financial leverage will improve a firm's ROE and EPS
- However, if returns are lower than the interest rate then borrowing money will worsen EPS and ROE

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Chapter 13 Lecture - Leverage and Capital Structure

Trans Am Corporation Example

	Current	Proposed
Assets	\$8,000,000	\$8,000,000
Debt	\$0	\$4,000,000
Equity	\$8,000,000	\$4,000,000
Debt/Equity Ratio	0.0	1.0
Share Price	\$20	\$20
Shares Outstanding	400,000	200,000
Interest rate	10%	10%

13-25

Trans Am Corp With and Without Debt

	Current Capital Structure: No Debt		
	Recession	Expected	Expansion
EBIT	\$500,000	\$1,000,000	\$1,500,000
Interest	0	0	0
Net Income	\$500,000	\$1,000,000	\$1,500,000
ROE	6.25%	12.50%	18.75%
EPS	\$1.25	\$2.50	\$3.75

	Proposed Capital Structure: Debt = \$4 million		
	Recession	Expected	Expansion
EBIT	\$500,000	\$1,000,000	\$1,500,000
Interest	400,000	400,000	400,000
Net Income	\$100,000	\$600,000	\$1,100,000
ROE	2.50%	15.00%	27.50%
EPS	\$0.50	\$3.00	\$5.50

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Leverage Effects

Variability in ROE

- **Current:** ROE ranges from 6.25% to 18.75%
- **Proposed:** ROE ranges from 2.50% to 27.50%

Variability in EPS

- **Current:** EPS ranges from \$1.25 to \$3.75
- **Proposed:** EPS ranges from \$0.50 to \$5.50

The variability in both ROE and EPS increases when financial leverage is increased

13-27

Example: Break-Even EBIT EPS are for both Capital Structures

$$\frac{\text{EBIT}}{400,000\text{sh}} = \frac{\text{EBIT} - \$4,000,000 (\text{interest})}{200,000\text{sh}}$$

$$\text{EBIT} = \left[\frac{400,000}{200,000} \right] (\text{EBIT} - \$400,000)$$

$$\text{EBIT} = 2 \times \text{EBIT} - \$800,000$$

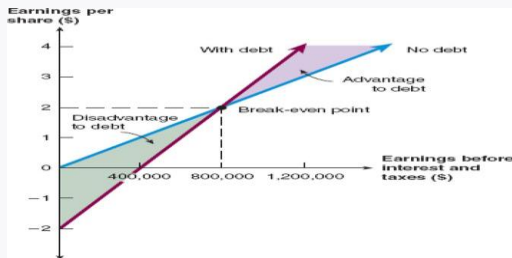
$$\text{EBIT} = \$800,000$$

$$\text{EPS} = \frac{800,000}{400,000} = \$2.00$$

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Chapter 13 Lecture - Leverage and Capital Structure

Break-Even EBIT



- If we expect EBIT to be *greater* than the break-even point, then leverage is *beneficial* to our stockholders
- If we expect EBIT to be *less* than the break-even point, then leverage is *detrimental* to our stockholders

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Trans Am Corp Conclusions

1. The effect of leverage depends on EBIT
When EBIT is higher, leverage is **beneficial**
2. Under the “Expected” scenario, leverage increases ROE and EPS
3. Shareholders are exposed to more risk with more leverage
ROE and EPS more sensitive to changes in EBIT

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Some Additional Information - Asymmetric Information and Signaling

- Managers know the firm’s future prospects better than investors.
- Managers would not issue additional equity if they thought the current stock price was less than the true value of the stock (given their inside information).
- Hence, investors often perceive an additional issuance of stock as a negative signal, and the stock price falls.

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