

CHAPTER 5

Managerial Accounting Basics, Cost Behavior, and Profit Analysis

- **Introduction to managerial accounting**
- **Cost classifications**
- **Profit analysis**
 - **Fee-for-service**
 - **Capitation**
- **Impact of cost structure on risk**

Managerial Accounting

■ ***Financial accounting:***

- Uses organizational (aggregate) data
- Designed for use by external parties
- Primarily historical
- Must adhere to external standards (GAAP)

■ ***Managerial accounting:***

- Uses organizational ***and subunit*** data.
- Designed for use by ***managers***.
- Primarily ***forward looking***.
- Does ***not*** adhere to external standards.

Cost Classifications

- **Cost measurement** is a critical part of managerial accounting.
 - In fact, there is an entire field of accounting called **cost accounting**.
 - Unfortunately, there is no single definition of the term **cost**. Different costs are used for different purposes.

- **Costs are classified in two major ways.** In this chapter, we focus on the relationship of costs to volume.

Discussion Item

Is there a difference between a *cost* and an *expense*?

Cost Classifications (Cont.)

- The relationship between costs and the volume of services provided is called **cost behavior** or **underlying cost structure**.
- If the underlying cost structure is known, managers can forecast costs at different levels of patient volume.
- In this context, costs may be:
 - **Fixed**, which are independent of volume
 - **Variable**, which depend on volume
 - **Semi-fixed**, which partially depend on volume

Cost Classifications (Cont.)

- In the *long run*, all costs are variable, and hence these cost classifications hold only in the *short run*, say, for one year.
- Also, no costs are fixed throughout an infinite range of volumes. Thus, the concept of cost classifications according to volume must be applied within some *relevant range* of patient volume.

Discussion Item

What are some examples of fixed and variable costs, say, for a hospital's clinical laboratory?

Cost Structure Example: Walk-In Clinic

Variable Costs Per Visit

| | |
|---------------------------|---------------------------|
| Clinical supplies | \$20 |
| Other supplies | <u>5</u> |
| Variable cost rate | <u><u>\$25</u></u> |

Fixed Costs Per Year

| | |
|------------|--------------------------------|
| Facilities | \$ 30,000 |
| Salaries | 190,000 |
| Overhead | <u>80,000</u> |
| | <u><u>\$300,000</u></u> |

| <u>Volume</u> | <u>Fixed Costs</u> | <u>Total Variable Costs</u> | <u>Total Costs</u> | <u>Average Cost</u> |
|---------------|--------------------|-----------------------------|--------------------|---------------------|
| 1 | \$300,000 | \$ 25 | \$300,025 | \$300,025 |
| 100 | 300,000 | 2,500 | 302,500 | 3,025 |
| 200 | 300,000 | 5,000 | 305,000 | 1,525 |
| 1,000 | 300,000 | 25,000 | 325,000 | 325 |
| 5,000 | 300,000 | 125,000 | 425,000 | 85 |
| 10,000 | 300,000 | 250,000 | 550,000 | 55 |
| 25,000 | 300,000 | 625,000 | 925,000 | 37 |

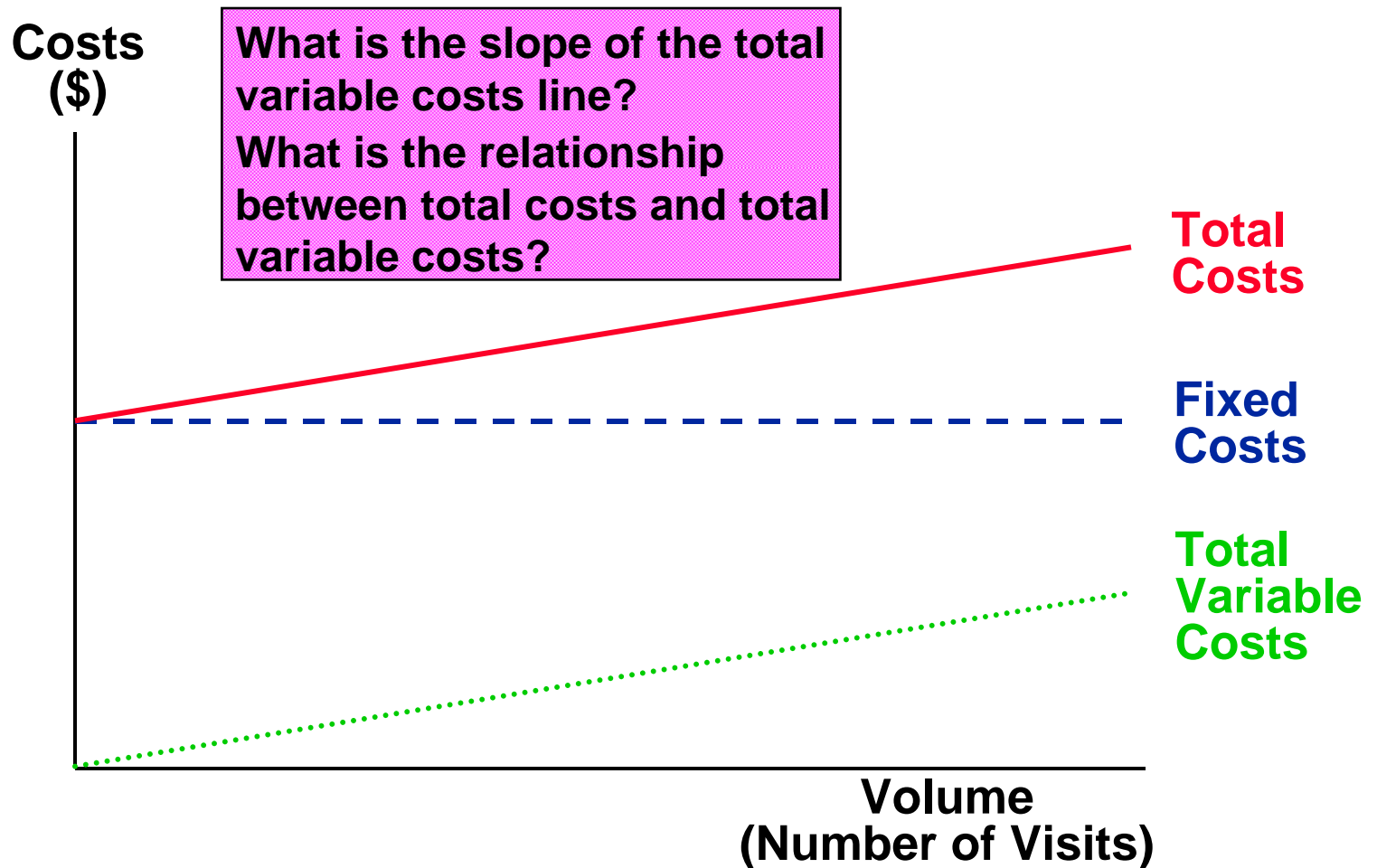
Note: The relevant range in this example is unrealistic.

Cost Structure Example (Cont.)

- Consider a volume of **5,000**:
 - Fixed costs = **\$300,000**.
 - Variable cost rate = **\$25**.
 - Total variable costs = **\$125,000**.
 - Total costs = **\$425,000**.
 - Average cost per visit = **\$85**.

- Now consider a volume of **10,000**:
 - Fixed costs = **\$300,000**.
 - Variable cost rate = **\$25**.
 - Total variable costs = **\$250,000**.
 - Total costs = **\$550,000**.
 - Average cost per visit = **\$55**.

Graphical Cost Structure



Profit (CVP) Analysis

- **Profit analysis**, also called **cost-volume-profit (CVP) analysis**, is a technique used to assess the effects of alternative volume assumptions on costs and profits.
- ? Why is such information valuable to health services managers?

Profit Analysis Example

Atlanta Clinic has forecasted the following cost data on the basis of **75,000** expected visits:

| | |
|----------------------|---------------------------|
| Fixed costs | \$4,967,462 |
| Total variable costs | <u>2,113,500</u> |
| Total costs | <u><u>\$7,080,962</u></u> |

Profit Analysis Example (Cont.)

What is the variable cost rate?

$$\begin{aligned}\text{Variable cost rate} &= \frac{\text{Total variable costs}}{\text{Volume}} \\ &= \frac{\$2,113,500}{75,000} \\ &= \mathbf{\$28.18} \text{ per visit.}\end{aligned}$$

Profit Analysis Example (Cont.)

What is Atlanta's cost behavior model?

$$\begin{aligned}\text{Total costs} &= \text{Fixed costs} + \text{Total variable costs} \\ &= \$4,967,462 + (\$28.18 \times \text{Volume}).\end{aligned}$$

For example, at 70,000 visits:

$$\begin{aligned}\text{Total costs} &= \$4,967,462 + (\$28.18 \times 70,000) \\ &= \$4,967,462 + \$1,972,600 \\ &= \mathbf{\$6,940,062}.\end{aligned}$$

Profit Analysis Example (Cont.)

Cost/Volume Summary:

Volume = 70,000

$$TC = \$4,967,462 + \$1,972,600 = \$6,940,062.$$

Volume = 75,000 (Base Case)

$$TC = \$4,967,462 + \$2,113,500 = \$7,080,962.$$

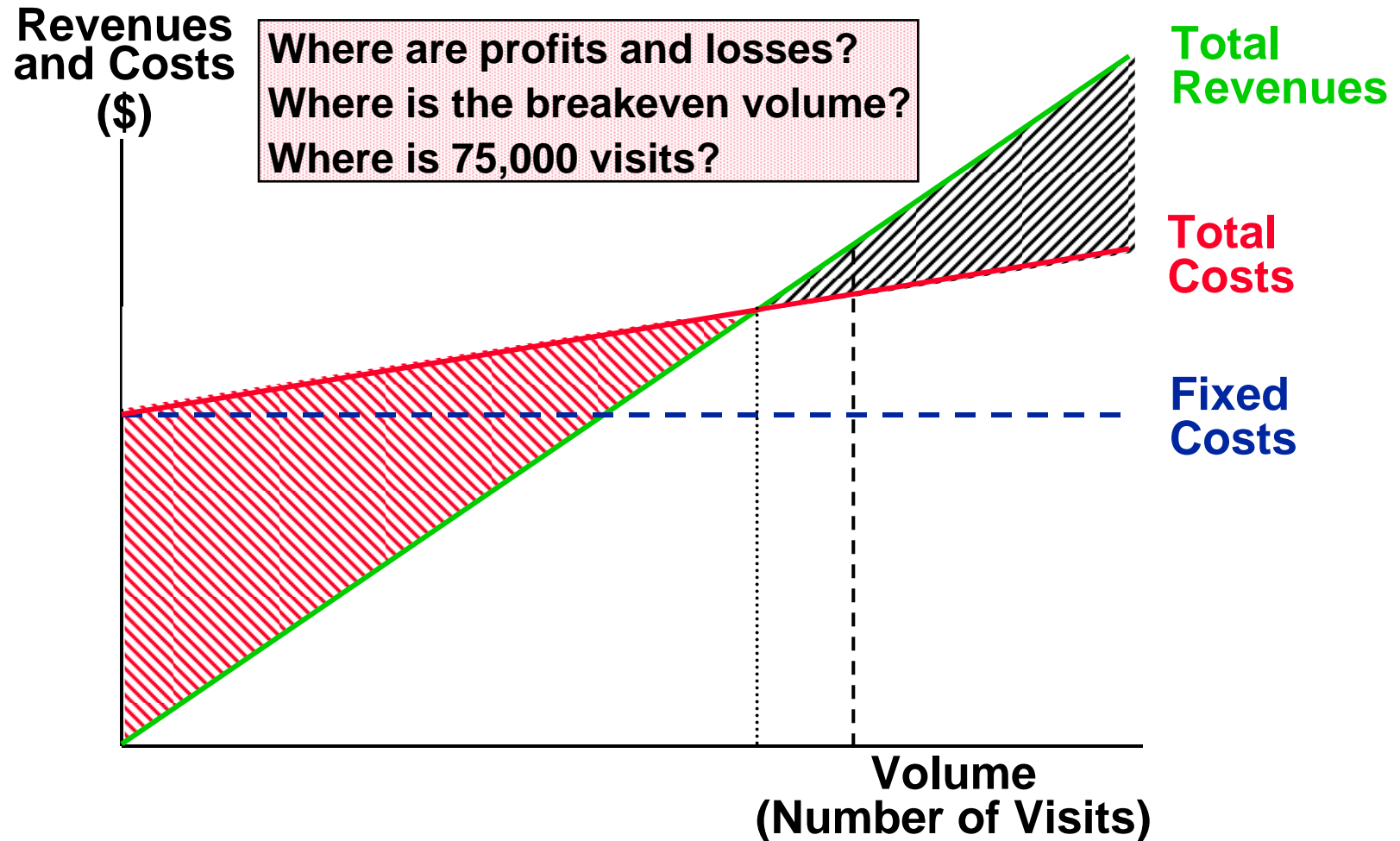
Volume = 80,000

$$TC = \$4,967,462 + \$2,254,400 = \$7,221,862.$$

Profit Analysis Example (Cont.)

- ? **What do Atlanta's managers learn from the data on the previous slide?**
- ? **Now, suppose that the average revenue per visit is expected to be \$100. What does the clinic's cost and revenue structure look like graphically?**

Graphical Profit Analysis



Forecasted (Projected) Profit and Loss (P&L) Statement

- The ***projected* P&L statement** uses cost structure information along with the revenue forecast and projected volume to forecast profitability.
- Although it looks like an income statement, it does not have to follow GAAP.
- Because it is a ***forecast***, it can be influenced by managerial actions.

Base Case P&L Statement

| | |
|--|--------------------------|
| Total revenues ($\$100 \times 75,000$) | \$7,500,000 |
| Total VC ($\$28.18 \times 75,000$) | <u>2,113,500</u> |
| Total CM ($\$71.82 \times 75,000$) | \$5,386,500 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u><u>\$ 419,038</u></u> |

VC = Variable costs.

CM = Contribution margin.

Base Case P&L Statement (Cont.)

- Note that *base case* total costs equal fixed costs plus total variable costs or $\$4,967,462 + \$2,113,500 = \$7,080,962$.
- Thus, Atlanta's *average per visit cost* is $\$7,080,962 / 75,000 = \94.41 .
- ? What happens to the average cost per visit as volume increases?
- ? Why?

Contribution Margin

- The **contribution margin** is defined as the difference between *per visit (unit) revenue* and the *variable cost rate*.
- It is the amount of each visit's revenue that is available to:
 - First cover fixed costs.
 - Flow to profit when fixed costs are covered.
- In this illustration, the contribution margin is $\$100 - \$28.18 = \$71.82$.
- ? What is the **total contribution margin**?

Breakeven Analysis

- **Breakeven analysis** is performed in many different finance contexts.
- Here, it is used to determine the **breakeven volume**, defined as that volume needed for an organization (or service or program) to be financially self-sufficient.
- There are two types of breakeven:
 - Accounting breakeven (zero profit)
 - Economic breakeven (with profit)

Breakeven Analysis (Cont.)

What is the *accounting breakeven* for Atlanta Clinic? There are two approaches to answer this question:

- Projected P&L approach
- Graphical approach

P&L Approach

$$\begin{aligned}
 \text{Total revenues} - \text{Total VC} - \text{FC} &= \text{Profit} \\
 (\$100 \times V) - (\$28.18 \times V) - \$4,967,462 &= \$0 \\
 & \$71.82 \times V = \$4,967,462 \\
 V &= \$4,967,462 / \$71.82 = \mathbf{69,165 \text{ visits.}}
 \end{aligned}$$

Breakeven Analysis (Cont.)

Note that the P&L approach can be recast in a *contribution margin format*.

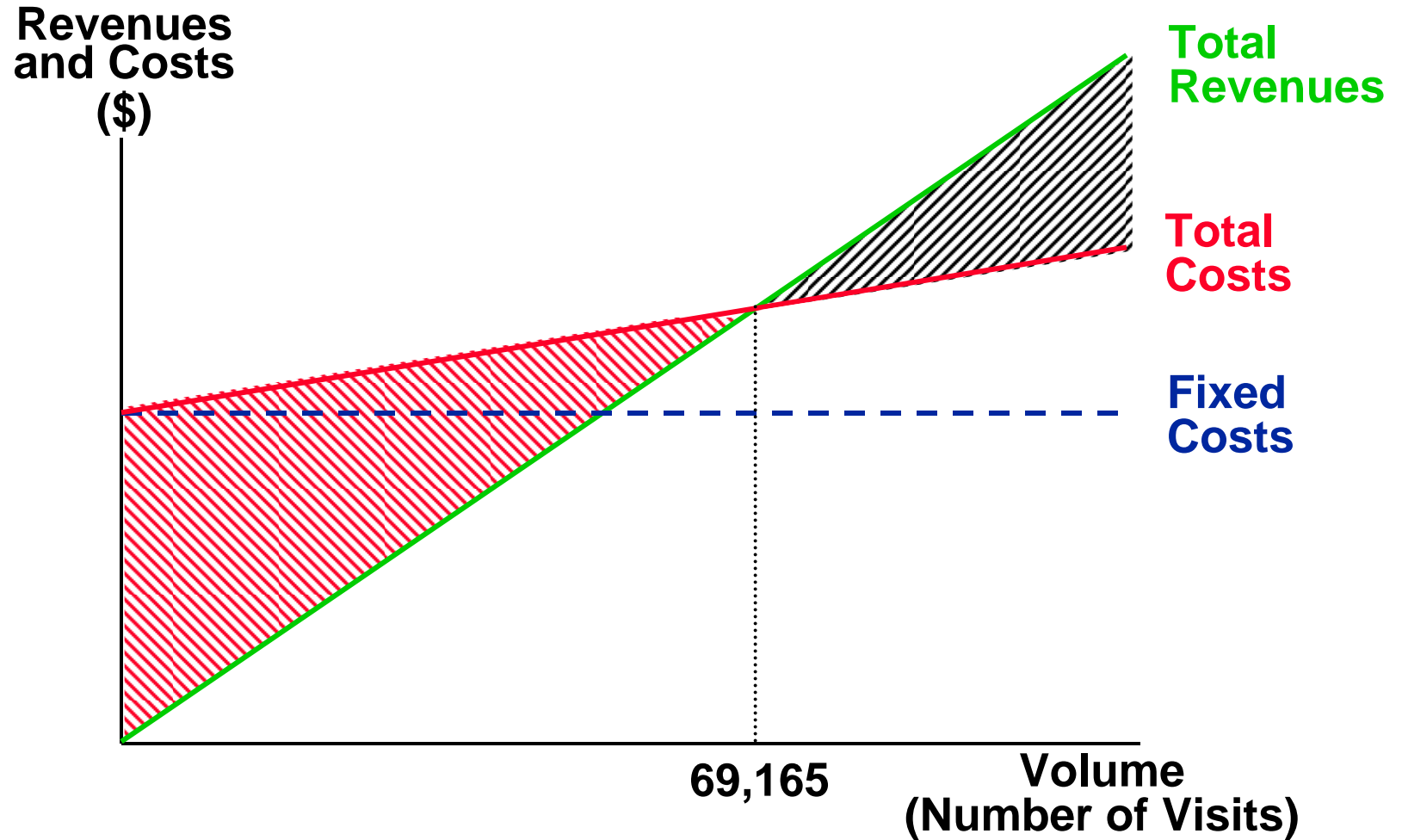
P&L Approach (Contribution Margin Format)

$$\text{CM} \times V = \text{Fixed costs}$$

$$\$71.82 \times V = \$4,967,462$$

$$V = \$4,967,462 / \$71.82 = \mathbf{69,165} \text{ visits.}$$

Graphical Breakeven Analysis



Breakeven Analysis (Cont.)

What is the *economic breakeven* if the desired profit level is **\$100,000**?

$$\text{CM} \times V = \text{Fixed costs} + \text{Profit}$$

$$\$71.82 \times V = \$5,067,462$$

$$V = \$5,067,462 / \$71.82 = \mathbf{70,558 \text{ visits.}}$$

Note that the accounting breakeven is **69,165** visits.

The additional number of visits needed is **1,393**.

$$1,393 \times \text{CM} = 1,393 \times \$71.82 = \mathbf{\$100,000.}$$

Operating Leverage

- **Operating leverage** is the use of fixed costs: the higher the proportion of fixed costs in the cost structure, the greater the operating leverage.
- Operating leverage is measured by the **degree of operating leverage (DOL)**, which is defined as:

$DOL = \text{Total CM} / \text{EBIT}$, where

EBIT = Earnings before interest and taxes.

Operating Leverage (Cont.)

- The DOL changes as volume changes, so a single value is valid *for only one volume*.
- What is the DOL at **75,000** visits?

$$\begin{aligned}\text{DOL} &= \text{Total CM} / \text{EBIT} \\ &= \$5,386,500 / \$419,038 \\ &= \mathbf{12.85}.\end{aligned}$$

- ? What does the DOL tell Atlanta's managers?

Operating Leverage (Cont.)

Using DOL:

| | | | | | |
|--------|------------|------|-----------|------|-----------|
| | | -10% | | +10% | |
| Visits | 67,500 | | 75,000 | | 82,500 |
| Profit | -\$119,612 | | \$419,038 | | \$957,688 |
| | | | -128.5% | | +128.5% |

? What does a high DOL mean?

Profit Analysis Under Discounted FFS

- Suppose Atlanta Clinic is confronted with a situation in which a payer contributing **5,000** visits wants a **40 percent** discount.
- Atlanta's managers might want to drop the contract because a **\$60** per visit payment is less than the **\$94.41** average per visit cost.
- But further analysis is required.

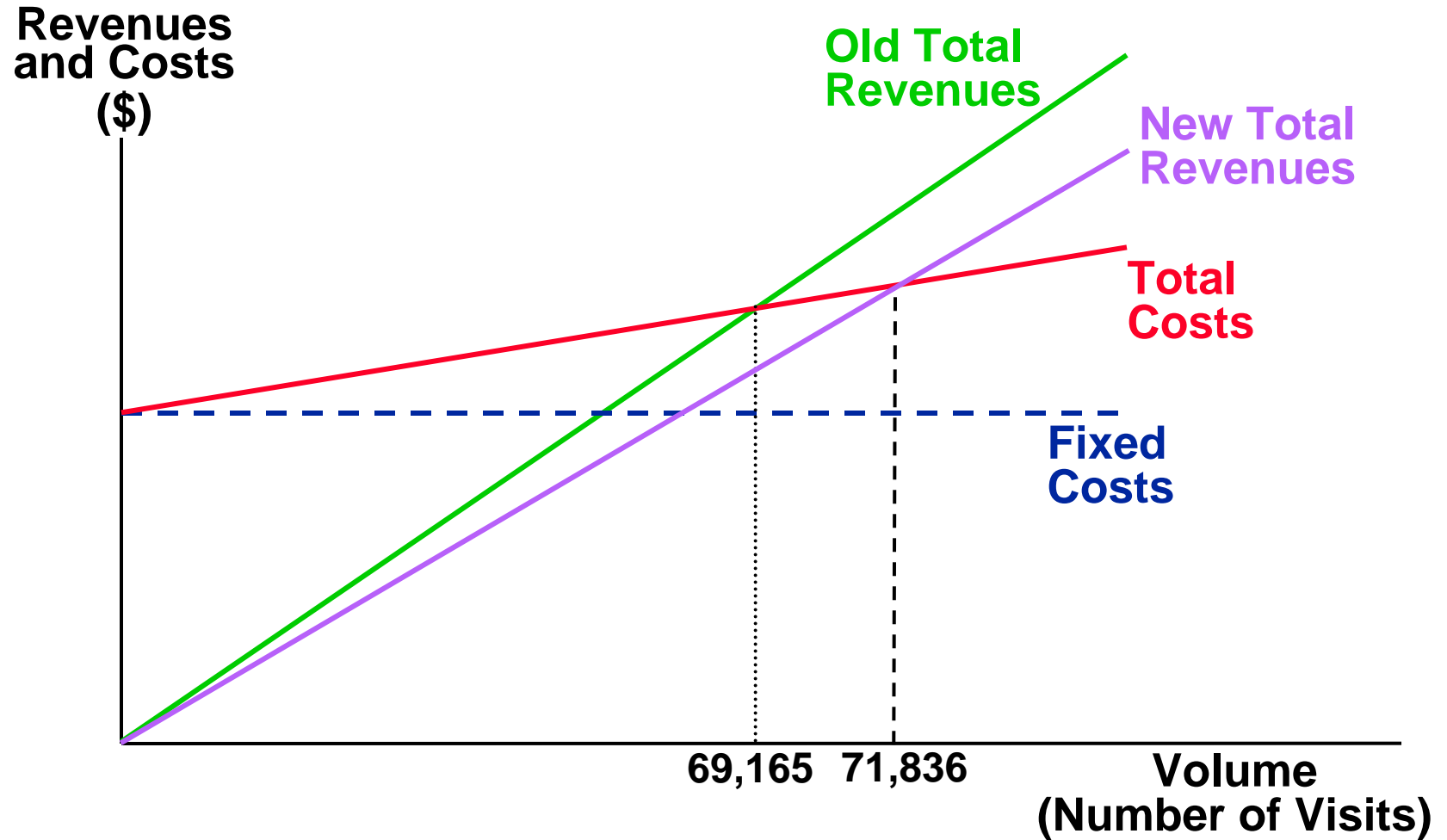
P&L Statement with 70,000 Visits

| | |
|---|--------------------------------|
| Total revenues ($\$100 \times 70,000$) | \$7,000,000 |
| Total VC ($\$28.18 \times 70,000$) | <u>1,973,600</u> |
| Total CM ($\$71.82 \times 70,000$) | \$5,027,400 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u><u>\$ 39,938</u></u> |

P&L Statement with Discount Visits

| | |
|--|--------------------------|
| Undiscounted revenue ($\$100 \times 70,000$) | \$7,000,000 |
| Discounted revenue ($\$60 \times 5,000$) | <u>300,000</u> |
| Total revenues ($\$97.33 \times 75,000$) | \$7,300,000 |
| Total VC ($\$28.18 \times 75,000$) | <u>2,113,500</u> |
| Total CM ($\$69.15 \times 75,000$) | \$5,186,500 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u><u>\$ 219,038</u></u> |

Graphical Profit Analysis



Marginal (Incremental) Analysis

- Suppose Atlanta Clinic is approached by a new insurer.
 - This payer is expected to contribute **5,000** additional visits.
 - However, it wants a **40** percent discount, resulting in a revenue of **\$60** per visit.
- At a volume of **80,000**, the clinic's average cost per visit is $\$7,221,862 / 80,000 = \mathbf{\$90.27}$, so again Atlanta's managers might be tempted to say "no."

Base Case P&L Statement

| | |
|--|--------------------------|
| Total revenues ($\$100 \times 75,000$) | \$7,500,000 |
| Total VC ($\$28.18 \times 75,000$) | <u>2,113,500</u> |
| Total CM ($\$71.82 \times 75,000$) | \$5,386,500 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u><u>\$ 419,038</u></u> |

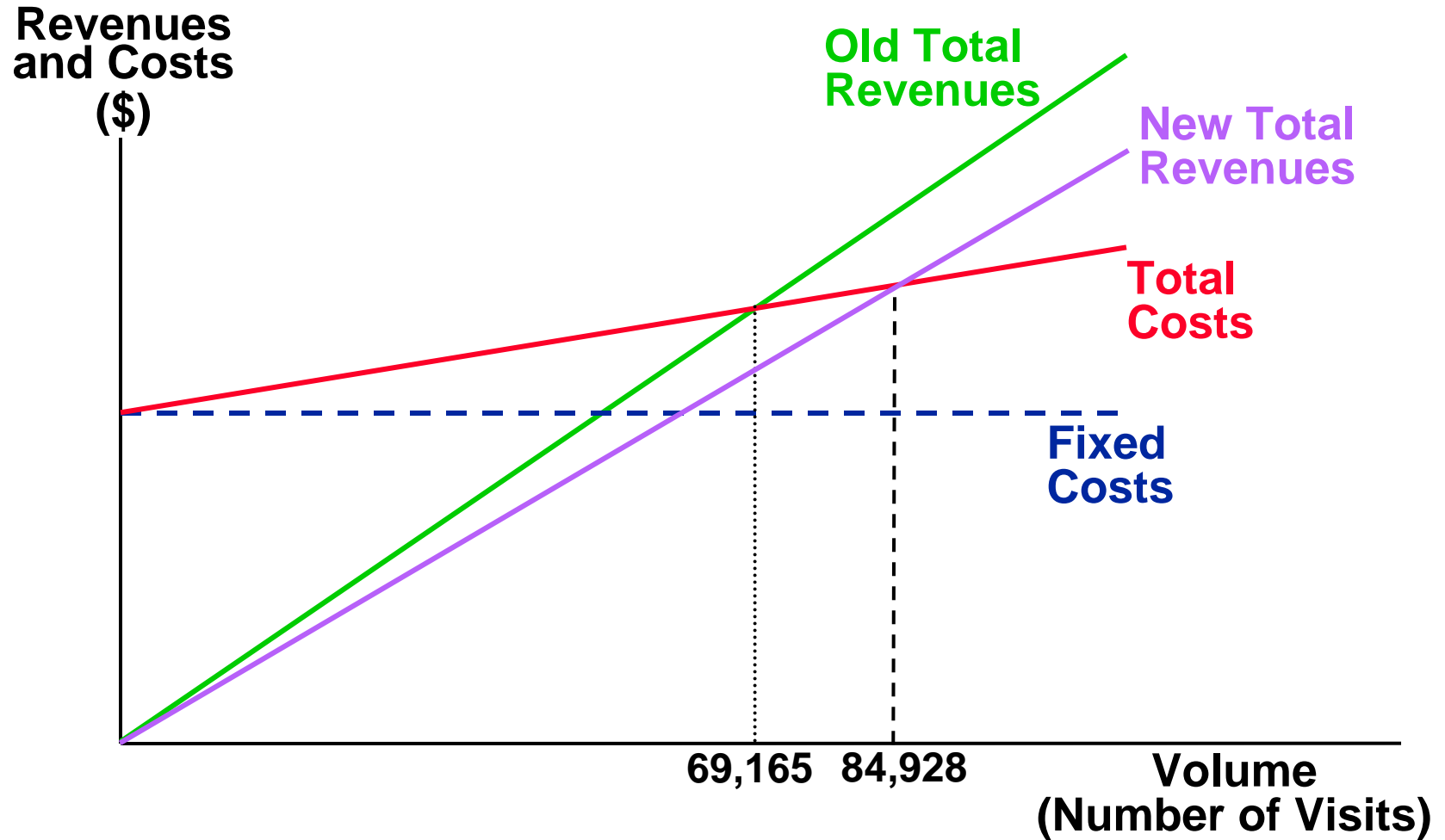
VC = Variable costs.

CM = Contribution margin.

P&L Statement With Added Volume

| | |
|--|--------------------------|
| Undiscounted revenue ($\$100 \times 75,000$) | \$7,500,000 |
| Discounted revenue ($\$60 \times 5,000$) | <u>300,000</u> |
| Total revenues ($\$97.50 \times 80,000$) | \$7,800,000 |
| Total VC ($\$28.18 \times 80,000$) | <u>2,254,400</u> |
| Total CM ($\$69.32 \times 80,000$) | \$5,545,600 |
| Fixed costs | <u>4,967,462</u> |
| Profit | <u><u>\$ 578,138</u></u> |

Graphical Profit Analysis



Marginal (Incremental) Analysis (Cont.)

- The **marginal cost** of each visit is the *variable cost rate* of **\$28.18** per visit.
- The marginal revenue on the new contract is **\$60** per visit, so the **contribution margin** is $\$60 - \$28.18 = \$31.82$.
- Thus, **5,000** incremental visits would add $5,000 \times \$31.82 = \$159,100$ to the bottom line: $\$419,038 + \$159,100 = \$578,138$.

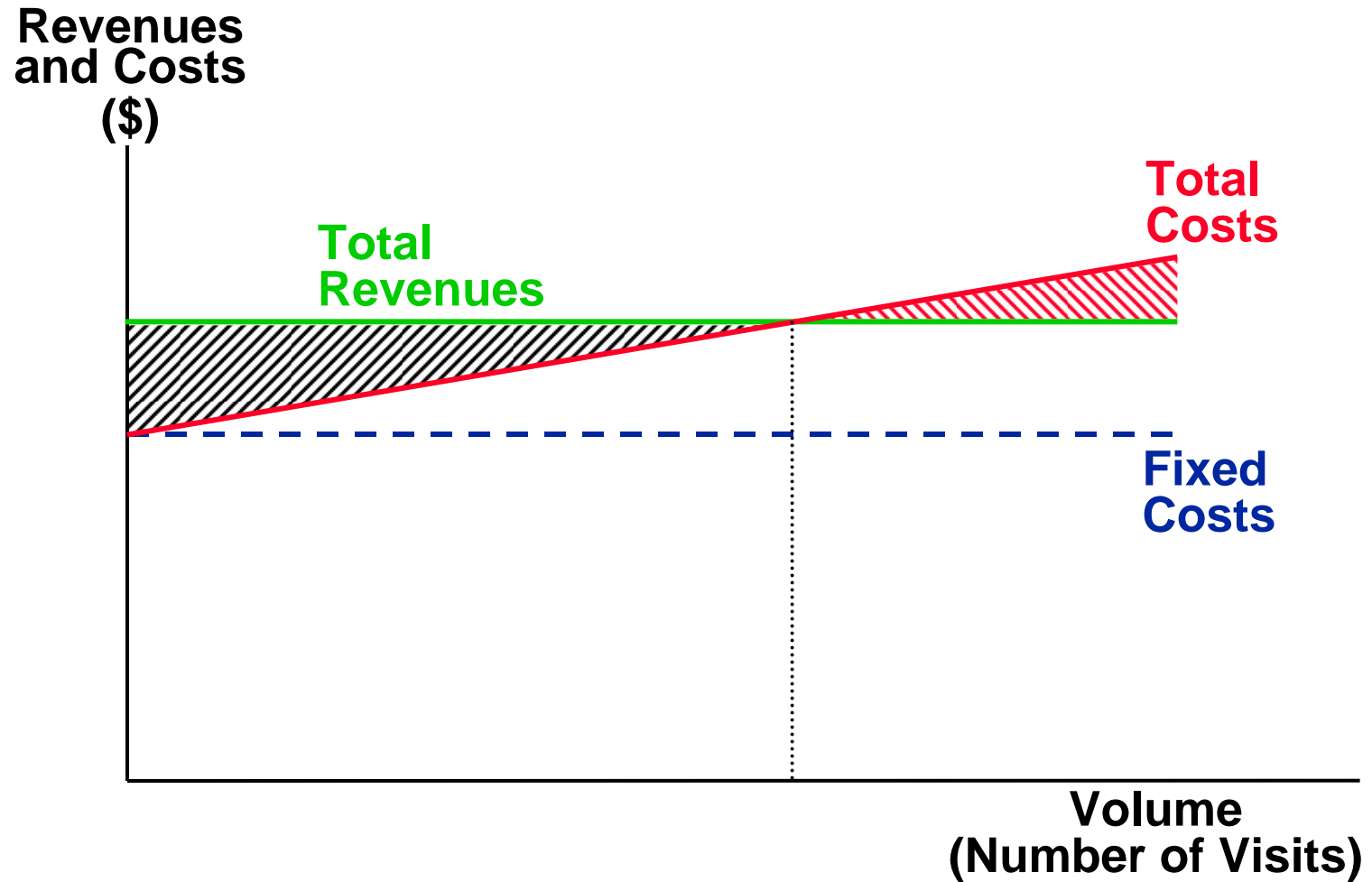
Discussion Item

At this point, the numerical analysis indicates that the offer should be accepted. Considering all the factors relevant to the decision, what should Atlanta Clinic's managers do?

Profit Analysis Under Capitation

- **Capitation** changes the way in which profit analysis is conducted
- Perhaps the best way to see the effects of capitation is by *graphical analysis*.
- We will examine two approaches to graphical analysis:
 - In terms of utilization (number of visits).
 - In terms of membership (covered lives).

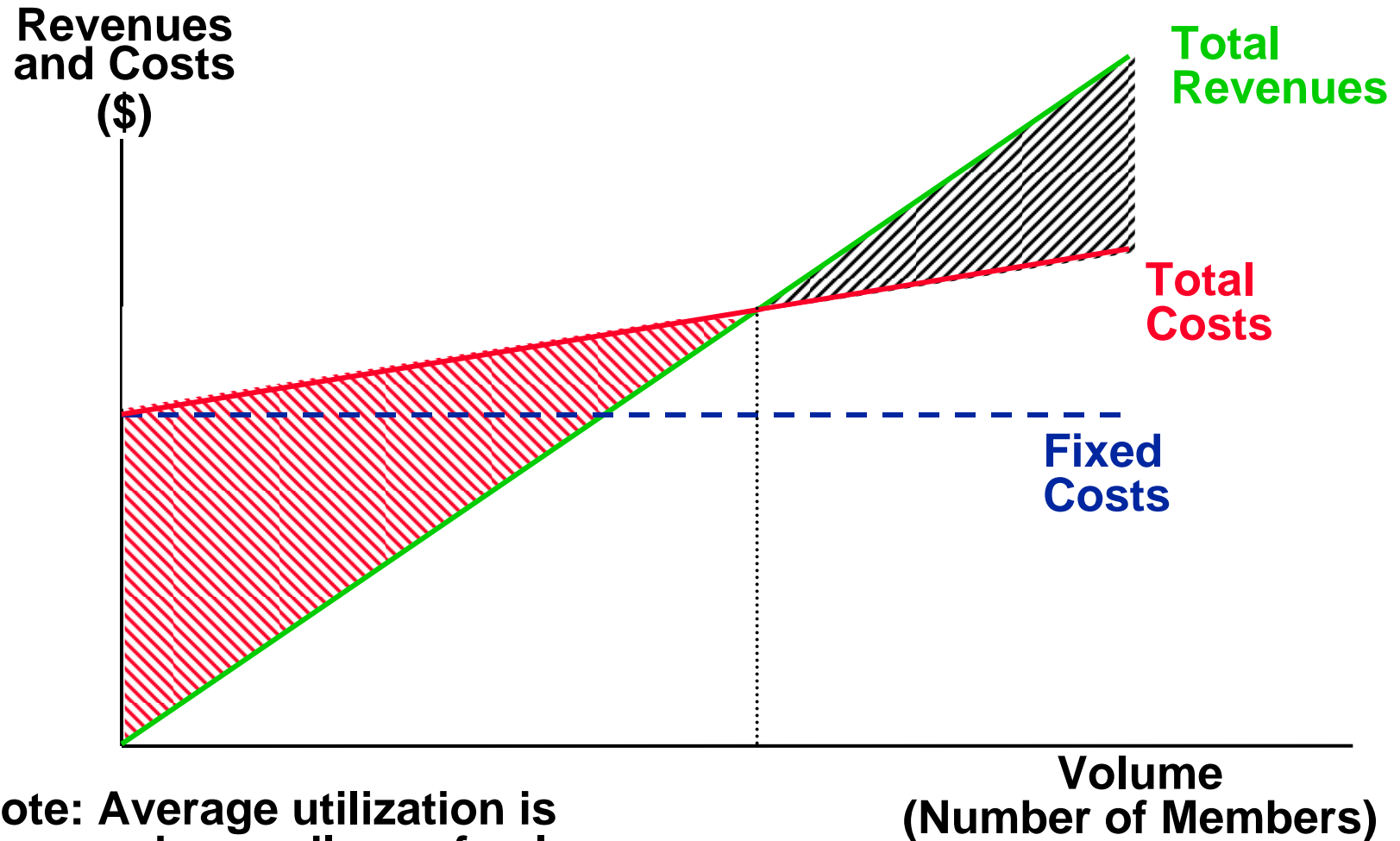
Analysis Based on Visits



Analysis Based on Visits (Cont.)

- On this graph, the profit and loss areas are *reversed* from the fee-for-service graph.
- This “perverse” result occurs because the contribution margin on a per visit basis is negative.
 - $\$0 - \$28.18 = -\$28.18$.
 - Each additional visit increases costs with no increase in revenues.

Graphical Analysis Based on Members



Note: Average utilization is assumed regardless of volume.

Analysis Based on Members (Cont.)

- Now, the profit and loss areas are the *same* as on the fee-for-service graph.
- On a per member basis, the contribution margin is positive.
 - Each additional member contributes positively to profits.
 - If per member annual revenue is **\$400** per member and variable costs (based on 4 visits) is $4 \times \$28.18 = \mathbf{\$112.72}$ per year, the contribution margin is $\$400 - \$112.72 = \mathbf{\$287.28}$.

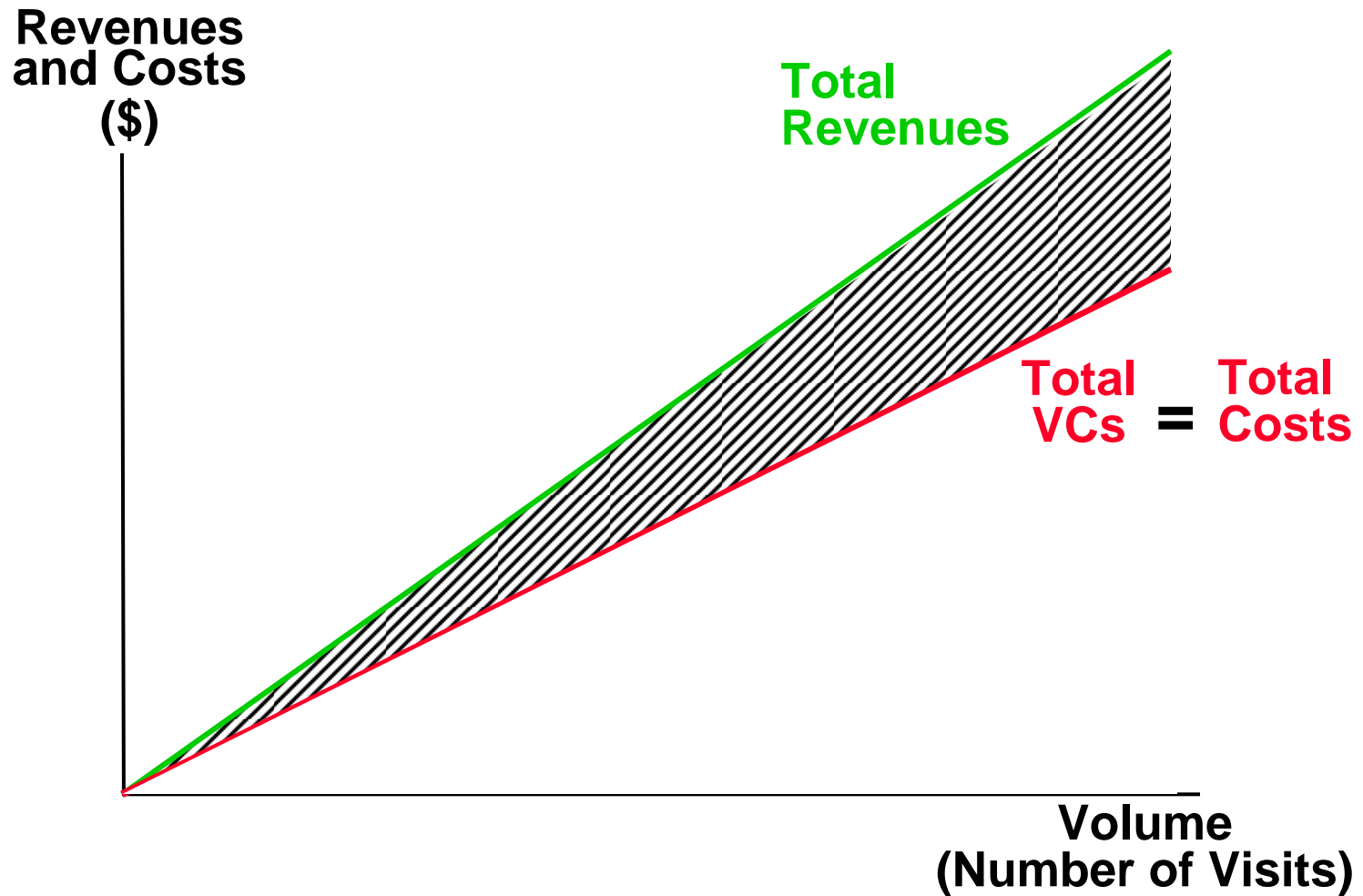
Discussion Items

- ? What do the graphs tell managers about the importance of *utilization management*:
 - ? Under FFS reimbursement?
 - ? Under capitation?
- ? What do the graphs tell about the importance of the *number of members* under capitation?

The Impact of Cost Structure on Risk

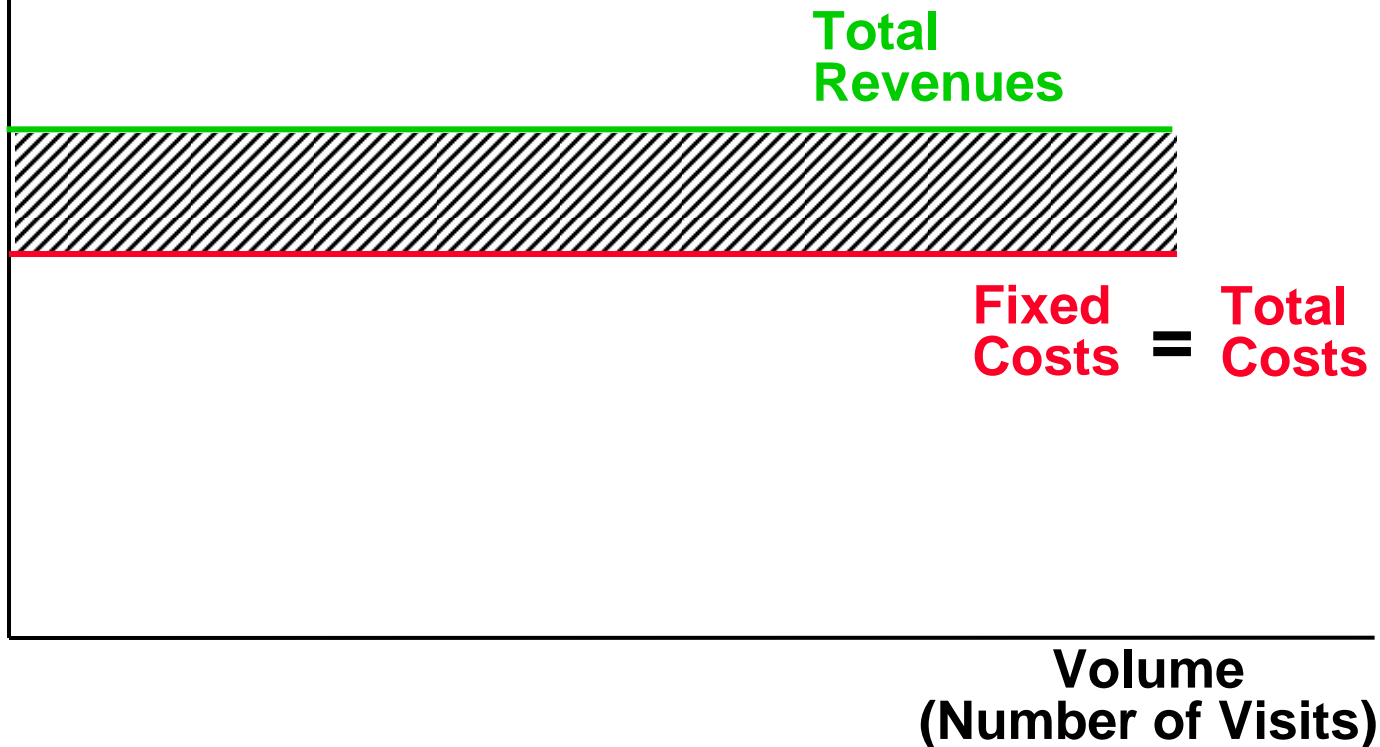
- If reimbursement is tied exclusively to volume (FFS), then the provider's **financial risk** is minimized if *all costs are variable*.
- If reimbursement is exclusively capitated, then the provider's financial risk is minimized if *all costs are fixed*.

Graphical Analysis under FFS



Graphical Analysis Under Capitation

Revenues
and Costs
(\$)



Discussion Item

What are the implications of the previous two slides for managerial decision making?

Conclusion

- This concludes our discussion of ***Chapter 5*** (Managerial Accounting Basics, Cost Behavior, and Profit Analysis).
- Although not all concepts were discussed in class, you are responsible for all of the material in the text.
- ? Do you have any questions?