

Table 15-4. If The Monopolist Increases Production From 2.5 To 5 Units, What Is Its Marginal Revenue

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Introduction to Marginal Revenue and Monopoly Pricing

Understanding monopolistic behavior requires a comprehensive grasp of concepts like marginal revenue (MR), total revenue (TR), and how they relate to a firm's decision-making process. Unlike perfectly competitive markets, where price equals marginal cost and firms are price takers, monopolists are price setters. They face the downward-sloping demand curve, which means that increasing output typically reduces the price that consumers are willing to pay. As a result, analyzing the change in revenue when a monopolist increases production involves calculating the marginal revenue associated with that additional output.

The question posed by Table 15-4—"If the monopolist increases production from 2.5 to 5 units, what is its marginal revenue?"—aims to quantify exactly how much additional revenue the firm gains when it expands its output by that interval. To answer this, it is essential to understand how total revenue changes with output and how this relates to the concept of marginal revenue.

Understanding the Data in Table 15-4

Interpreting the Table's Data

While the specific data from Table 15-4 are not provided here, typical monopoly tables include columns such as:

- Quantity (Q)
- Price (P)
- Total Revenue (TR)

Assuming the table lists TR values at various quantities, the key is to identify the total revenue at 2.5 units and at 5 units. The change between these two points will inform the marginal revenue.

For example, suppose:

Quantity (units)	Price (per unit)	Total Revenue (TR)
2.5	P ₁	TR ₁
5	P ₂	TR ₂

The marginal revenue for increasing output from 2.5 to 5 units is calculated as:

$$MR = \frac{TR_2 - TR_1}{5 - 2.5}$$

This formula captures the average change in total revenue per additional unit produced within that interval.

Calculating Marginal Revenue: Step-by-Step Process

Step 1: Identify Total Revenue at 2.5 Units

Locate the total revenue when the firm produces 2.5 units. This value might be given directly in the table or calculated as:

$$TR = P \times Q$$

where P is the price at that quantity.

Step 2: Identify Total Revenue at 5 Units

Similarly, find the total revenue when production is increased to 5 units.

Step 3: Compute the Change in Total Revenue

Calculate the difference:

$$\Delta TR = TR_{\{Q=5\}} - TR_{\{Q=2.5\}}$$

This difference indicates how much revenue increases as output expands from 2.5 to 5 units.

Step 4: Calculate the Marginal Revenue

Divide the change in total revenue by the change in quantity:

$$MR = \frac{\Delta TR}{\Delta Q} = \frac{TR_{Q=5} - TR_{Q=2.5}}{5 - 2.5}$$

This value represents the marginal revenue associated with producing the additional 2.5 units.

Understanding the Relationship Between Price, Quantity, and Marginal Revenue in Monopoly

The Downward-Sloping Demand Curve

In a monopoly, the demand curve is downward sloping, implying that to sell more units, the monopolist must lower the price. Consequently, the marginal revenue curve lies below the demand curve because each additional unit sold decreases the price not just for that unit but also for all previous units.

Deriving the Marginal Revenue Curve

The MR curve for a monopolist can be derived from the demand curve. If the demand curve is linear, such as:

$$P = a - bQ$$

then the total revenue:

$$TR = P \times Q = (a - bQ)Q = aQ - bQ^2$$

and the marginal revenue:

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$$MR = \frac{d(TR)}{dQ} = a - 2bQ$$

This means that the MR curve has twice the slope of the demand curve and lies below it.

Implication for Production Decisions

Since MR is less than price (P) for a monopolist, the firm maximizes profit by producing where:

$$MR = MC$$

where MC is marginal cost. Recognizing how MR declines faster than price as output increases is crucial for understanding the monopolist's output choices.

Impacts of Increasing Production from 2.5 to 5 Units

What Does the Change in Revenue Tell Us?

Suppose, based on the table, the total revenue at 2.5 units is TR_1 , and at 5 units, it is TR_2 . The calculated MR over this interval provides insight into:

- How profitable the additional units are
- Whether increasing production is beneficial, considering marginal costs
- How the monopolist's revenue responds to scale expansion

Possible Outcomes

Depending on the data:

- If MR is positive but less than the price at 2.5 units, increasing output might increase total revenue, but at a decreasing rate.
- If MR is negative or zero, increasing production beyond 2.5 units might not be profitable or could reduce total revenue.

Practical Application: Using the Data to Inform Monopoly Decisions

Step 1: Calculate the Exact MR

Using the actual TR values from Table 15-4, plug in the numbers:

$$MR = \frac{TR_{\{5\}} - TR_{\{2.5\}}}{\{2.5\}}$$

This calculation gives the average marginal revenue over the interval.

Step 2: Compare MR to Marginal Cost (MC)

To determine if increasing production is optimal, compare the MR with the firm's marginal cost at that level of output. If MR exceeds MC, increasing output is profitable; if not, the firm should hold or reduce production.

Step 3: Decision-Making Based on MR

- If MR is positive and greater than MC, the monopolist should increase production.
- If MR is negative or less than MC, it should decrease or maintain current output levels.

Conclusion and Summary

Understanding the change in marginal revenue when a monopolist increases production from 2.5 to 5 units is fundamental in analyzing monopolistic behavior. The calculation hinges on the data provided in Table 15-4, primarily the total revenue at these quantities. The process involves determining the difference in total revenue at these points and dividing by the change in quantity, resulting in the marginal revenue for that interval.

This calculation not only informs about the additional revenue gained from increasing output but also guides strategic decisions. Since the marginal revenue curve for a monopolist lies below the demand curve, it underscores the importance of considering both revenue and cost structures when determining the optimal output level.

In real-world applications, understanding these concepts helps monopolists optimize profits, avoid overproduction that erodes margins, and identify the most profitable scale of operation. The interplay

between marginal revenue, marginal cost, and demand elasticity ultimately determines the monopolist's production strategy, shaping market outcomes and consumer prices.

Summary Points:

- Marginal revenue measures the additional revenue from producing one more unit.
- In a monopoly, MR is derived from the demand curve and lies below the price.
- Calculating MR between 2.5 and 5 units involves the change in total revenue over that interval.
- The MR value guides the monopolist's production decisions, balancing revenue gains against marginal costs.
- Understanding these dynamics is essential for analyzing monopolistic market behavior and strategic pricing.

Note: To perform a precise calculation, substitute the actual total revenue values from Table 15-4 into the formulas provided.

Frequently Asked Questions

What happens to the monopolist's marginal revenue when it increases production from 2.5 to 5 units according to Table 15-4?

The marginal revenue decreases as the monopolist increases production from 2.5 to 5 units, reflecting the downward-sloping demand curve.

Why does the marginal revenue decline when the monopolist increases output from 2.5 to 5 units?

Because to sell additional units, the monopolist must lower the price, which reduces the revenue gained from previous units, leading to a decline in marginal revenue.

In Table 15-4, how is the marginal revenue calculated when increasing production from 2.5 to 5 units?

Marginal revenue is calculated as the change in total revenue divided by the change in quantity, which shows the additional revenue gained from producing an extra unit.

What is the significance of understanding marginal revenue when a monopolist increases production from 2.5 to 5 units?

It helps the monopolist determine the profit-maximizing level of output, as profit is maximized when marginal revenue equals marginal cost.

Based on Table 15-4, if marginal revenue becomes negative after increasing from 2.5 to 5 units, what does it imply?

It implies that increasing production beyond a certain point reduces total revenue, so the monopolist should not produce more than that level to maximize profit.

How does the change in marginal revenue from 2.5 to 5 units inform the monopolist's production decisions?

It indicates whether increasing output will increase or decrease revenue, guiding the monopolist to produce up to the point where marginal revenue equals marginal cost for optimal profit.

Additional Resources

Table 15-4. If The Monopolist Increases Production From 2.5 To 5 Units, What Is Its Marginal Revenue

is a fundamental concept in understanding how monopolists make production decisions and how their revenue responds to changes in output. This specific question delves into the core of microeconomic analysis, illustrating the relationship between output levels and revenue generation for a monopolist. Analyzing this transition from 2.5 to 5 units provides insights into marginal revenue (MR) and helps clarify how monopolists evaluate the profitability of increasing production.

Understanding Marginal Revenue in a Monopolistic Context

Before diving into the specifics of the change from 2.5 to 5 units, it's essential to grasp what marginal revenue entails in the context of monopoly. Unlike perfect competition, where marginal revenue equals price, a monopolist faces a downward-sloping demand curve. This means that to sell additional units, the monopolist must lower the price not just for the extra unit but for all previous units sold—this phenomenon significantly impacts marginal revenue.

Key Concepts:

- Demand Curve: Shows the relationship between the price consumers are willing to pay and the quantity demanded.
- Total Revenue (TR): Calculated as Price (P) multiplied by Quantity (Q).
- Marginal Revenue (MR): The change in total revenue resulting from selling one additional unit of output.

In a monopolistic setting:

- MR is less than the price because lowering the price to sell additional units reduces revenue from all other units sold.
- MR can be negative if the price reduction needed to sell more units is large enough.

The Significance of the Change from 2.5 to 5 Units

Transitioning production from 2.5 to 5 units involves understanding how total revenue reacts to this

increase and, consequently, what the marginal revenue is during this interval. This change is often used as an illustrative example to teach the concepts of marginal revenue and elasticity.

Why the Interval Matters:

- It demonstrates the principle that increasing output does not always increase revenue proportionally.
- It helps identify whether the firm is operating in the elastic, unit-elastic, or inelastic portion of the demand curve.
- It offers a practical way to calculate MR using given data (such as prices and quantities).

Practical Importance:

- Monopolists aim to maximize profit where MR equals marginal cost (MC).
- Knowing how MR changes with output guides decisions on optimal production levels.

Step-by-Step Breakdown: Calculating Marginal Revenue from 2.5 to 5 Units

1. Gather the Data

In typical textbook examples or problem sets like Table 15-4, you are provided with:

- The demand schedule or demand curve equation.
- Total revenue at various quantities.
- Corresponding prices at each quantity.

Suppose the table provides the following data:

Quantity (Q)	Price (P)	Total Revenue (TR)
2.5	P_1	TR_1
5	P_2	TR_2

Note: For precise calculations, actual values of P_1 , P_2 , TR_1 , and TR_2 are necessary.

2. Calculate Total Revenue at Both Quantities

- $TR_1 = P_1 \times 2.5$
- $TR_2 = P_2 \times 5$

This step confirms the total revenues at the initial and final quantities.

3. Compute the Change in Total Revenue

- $\Delta TR = TR_2 - TR_1$

This value indicates the total revenue change as output increases from 2.5 to 5 units.

4. Determine the Change in Quantity

- $\Delta Q = 5 - 2.5 = 2.5$ units

5. Calculate Marginal Revenue

- MR over this interval = $\Delta TR / \Delta Q$

This gives the average marginal revenue for the increase from 2.5 to 5 units.

Interpreting the Results

Positive, Zero, or Negative MR?

- Positive MR: Indicates that increasing output increases total revenue, typical in the elastic portion of demand.
- Zero MR: Occurs at the point of unit elasticity.
- Negative MR: Total revenue decreases with increased output, implying inelastic demand and that the monopolist might be overproducing.

Understanding where the MR falls helps the monopolist decide whether to increase or decrease production.

Why is MR Less Than Price?

In monopolies:

- To sell more units, the firm must lower the price.
- This price cut affects all units sold, reducing the additional revenue gained from selling the last unit.
- As a result, MR is always less than the current price (except at the very first unit where they are equal).

Broader Implications for Monopoly Strategy

1. Profit Maximization Point

The monopolist maximizes profit where MR equals marginal cost (MC). By analyzing how MR changes with output, the firm can decide whether increasing or decreasing production will be profitable.

2. Elasticity and Revenue

- When demand is elastic ($|E_d| > 1$), increasing production tends to increase total revenue.
- When demand is inelastic ($|E_d| < 1$), increasing production decreases total revenue.
- At the unit elastic point, MR is zero.

3. Production Decisions

Understanding the MR between 2.5 and 5 units guides the firm in adjusting output:

- If MR is positive but decreasing, the firm might still gain from increasing output.
- If MR turns negative, further increases in production reduce revenue and profit.

Visualizing the Concept: Graphs & Demand Curves

Visual aids are invaluable for understanding:

- Demand Curve: Downward-sloping line showing the relationship between quantity and price.
- Total Revenue Curve: Typically shaped like a parabola, reaching a maximum at the point of unit elasticity.
- Marginal Revenue Curve: Lies below the demand curve and slopes downward, crossing the quantity axis at the same point where total revenue is maximized.

By plotting these, one can observe:

- The point where MR hits zero (total revenue maximum).
- The segments where MR is positive or negative.

Summary: Key Takeaways from the Production Increase

- The change from 2.5 to 5 units involves calculating the difference in total revenue and dividing by the change in quantity.
- Marginal revenue in this interval can be positive, zero, or negative depending on the demand elasticity at those quantities.
- This analysis helps monopolists identify the most profitable production level, emphasizing the importance of understanding demand elasticity and MR behavior.

Final Thoughts:

Understanding Table 15-4. If The Monopolist Increases Production From 2.5 To 5 Units, What Is Its Marginal Revenue provides critical insights into monopolistic pricing and output strategies. By carefully analyzing how revenue responds to changes in output, firms can make informed decisions that maximize profits, avoid overproduction, and understand the fundamental economic principles that govern market power.

Additional Resources

- Microeconomics textbooks (Chapters on Monopoly and Market Power)
- Online calculators for demand and revenue analysis
- Graphing tools to visualize demand, TR, and MR curves

In essence, analyzing the marginal revenue associated with increasing production from 2.5 to 5 units illuminates the core mechanics of monopoly pricing strategies and underscores the importance of demand elasticity in profit maximization.

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