

The Marginal Revenue Curve Of A Firm With Market Power Will Always Lie Below Its Demand Curve Because

The Marginal Revenue Curve Of A Firm With Market Power Will Always Lie Below Its Demand Curve Because it reflects fundamental economic principles related to how firms with market power, such as monopolies or monopolistic competitors, derive revenue from their pricing strategies. Unlike perfectly competitive firms that face a horizontal demand curve and where marginal revenue (MR) equals price (P), firms with market power operate under a downward-sloping demand curve, which significantly influences the shape and position of their MR curve. Understanding why the MR curve always lies below the demand curve is crucial for comprehending pricing decisions, output levels, and profitability in imperfectly competitive markets. This article explores the reasons behind this relationship in detail, supported by economic theory, graphical analysis, and practical implications.

Understanding Demand and Marginal Revenue in Market Power Contexts

Demand Curve: The Consumer's Perspective

The demand curve represents the relationship between the price of a good and the quantity demanded by consumers. For a firm with market power, this curve is typically downward-sloping, indicating that to sell additional units, the firm must lower its price. This inverse relationship is fundamental to market power because the firm can influence the market price through its sales decisions.

Marginal Revenue: The Firm's Revenue Increment

Marginal revenue, on the other hand, measures the additional revenue generated from selling one more unit of a good. It is derived from the total revenue (TR), which is the product of price (P) and quantity sold (Q):

$$TR = P \times Q$$

The marginal revenue (MR) is the derivative of total revenue with respect to quantity:

$$MR = d(TR) / dQ$$

For firms with market power, MR is not equal to the price but is instead

influenced by the nature of the demand curve.

Why the Marginal Revenue Curve Lies Below the Demand Curve

1. The Downward-Sloping Demand Curve and Price Reduction Effect

When a firm with market power wants to increase sales by one additional unit, it must lower the price on all units sold, not just the extra unit. This is because the firm's demand curve is downward sloping, meaning that to sell more, the firm must accept a lower price.

Key Point: The price reduction affects all units sold, which causes the marginal revenue to be less than the price at any given quantity.

2. The Derivation of MR from the Demand Curve

Mathematically, if the demand curve is linear and represented as:

$$P = a - bQ$$

where:

- P = price
- Q = quantity
- a = intercept (maximum price when $Q=0$)
- b = slope (rate at which price decreases with Q)

The total revenue (TR) is:

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

Differentiating TR with respect to Q yields:

$$MR = d(TR)/dQ = a - 2bQ$$

Notice that the MR curve:

- Has the same intercept as the demand curve (a)
- Has twice the slope ($2b$)
- Is always below the demand curve ($a - bQ$) for $Q > 0$

Implication: Since MR declines twice as fast as the demand curve, it must always be below it after the starting point.

3. Geometric Explanation Using Graphs

Graphically, the demand curve is a straight line downward-sloping line, and the MR curve is also linear but steeper, intersecting the quantity axis at half the intercept of the demand curve. Because the MR curve falls faster, it remains below the demand curve at all quantities beyond zero.

Visual Summary:

- Demand curve: $P = a - bQ$
- MR curve: $MR = a - 2bQ$
- Both intersect the vertical axis at the same point (a), but the MR curve intersects the horizontal axis at half the quantity where the demand curve would do so.

Economic Intuition Behind the Position of MR Below Demand

1. The Price Effect and Quantity Effect

The reason MR is less than P stems from the combined effect of:

- The price effect: lowering the price to sell an additional unit decreases revenue from all previous units.
- The quantity effect: selling an additional unit increases total revenue.

Since the price effect is negative (causing revenue to fall from the existing units), the marginal revenue must account for this loss, making it less than the price.

2. Impact on Pricing and Output Decisions

Understanding that MR lies below demand informs the firm's profit-maximizing decision:

- The firm increases output as long as $MR > MC$ (marginal cost).
- Equilibrium occurs where $MR = MC$.
- Because MR is below demand, the firm chooses a lower output and a higher price than a perfectly competitive firm would.

Practical Implications for Firms with Market Power

1. Pricing Strategies

Firms recognize that to increase output, they must accept a lower price, which reduces marginal revenue. Therefore, they must carefully analyze their demand elasticity to optimize pricing.

2. Revenue and Profit Optimization

Since MR is always below demand, firms can increase total revenue by decreasing output until MR equals marginal cost, not by setting the highest possible price. This understanding prevents overpricing that would lead to a decline in total revenue.

3. Market Power Limitations

The gap between the demand curve and the MR curve reflects the inherent limitations of market power: the firm cannot simply set any price it wants and maximize revenue because lowering prices to sell additional units reduces marginal revenue.

Summary and Conclusion

- The marginal revenue curve of a firm with market power always lies below its demand curve because each additional unit sold requires a reduction in price that affects all previous units, reducing the incremental revenue gained from sales.
- Mathematically, this is demonstrated through the linear demand and MR equations, where the MR curve has twice the slope of the demand curve and intersects the quantity axis at half the demand curve's intercept.
- Graphically, the MR curve is steeper and lies below the demand curve for any positive quantity, reinforcing the idea that firms with market power face diminishing marginal revenue.
- This relationship is fundamental in understanding the firm's pricing and output decisions, emphasizing the importance of demand elasticity and the trade-offs involved in market power.

In essence, the position of the marginal revenue curve below the demand curve encapsulates the core challenge faced by firms with market power: balancing the desire to increase sales with the negative impact of price reductions on revenue. Recognizing this relationship enables firms to develop more effective pricing strategies and optimize their profitability within the constraints of market demand.

Frequently Asked Questions

Why does the marginal revenue curve of a firm with market power always lie below its demand curve?

Because the firm must lower its price to sell additional units, causing marginal revenue to decrease faster than the price, resulting in the MR curve lying below the demand curve.

How does market power influence the position of the marginal revenue curve relative to the demand curve?

Market power allows a firm to set prices above marginal cost, but to sell more, it must lower the price, which reduces marginal revenue below the demand curve, making MR lie below demand.

Can the marginal revenue curve ever coincide with the demand curve in a market with market power?

No, because for a firm with market power, marginal revenue is always less than the price at each quantity due to the need to lower prices to sell additional units.

What is the economic intuition behind the marginal revenue curve lying below the demand curve?

The intuition is that to increase sales, the firm must reduce the price on all units sold, so the additional revenue gained from selling one more unit is less than the price at that quantity.

Does the position of the marginal revenue curve affect the firm's profit-maximizing output?

Yes, since the firm maximizes profit where marginal revenue equals marginal cost, understanding the MR curve's position relative to demand helps determine the optimal output level.

In what type of market structures do firms have a downward-sloping demand curve and a marginal revenue curve below it?

In imperfectly competitive markets such as monopolies and monopolistic competition, where firms have market power and face a downward-sloping demand curve.

How does the slope of the demand curve relate to the gap between the demand and marginal revenue curves?

A steeper demand curve results in a smaller gap between the demand and MR curves, while a flatter demand curve increases the gap due to greater price reductions needed to sell additional units.

Why is understanding the position of the MR curve important for firms with market power?

Because it helps the firm determine the profit-maximizing output and pricing strategies, ensuring they produce where MR equals marginal cost.

What happens to the marginal revenue curve when the demand curve becomes perfectly elastic?

When demand is perfectly elastic, the demand curve is horizontal, and the marginal revenue curve coincides with it at the same level, since any change in quantity doesn't affect the price.

How does the concept of marginal revenue apply in real-world markets with market power?

In real-world markets, firms with market power use the relationship between demand and MR to set prices and output levels that maximize profits, recognizing that MR is always below demand due to price reductions on additional sales.

Additional Resources

The Marginal Revenue Curve Of A Firm With Market Power Will Always Lie Below Its Demand Curve Because

Understanding the relationship between a firm's demand curve and its marginal revenue (MR) curve is fundamental in microeconomics, especially when analyzing firms with market power—such as monopolies or firms with significant pricing control. A key concept that often confuses students and practitioners alike is why the MR curve always lies below the demand curve for such firms. This piece delves into the reasons behind this phenomenon, exploring the underlying economic principles, assumptions, and implications.

Fundamental Principles: Demand and Revenue in Market Power Contexts

Before we analyze the specific relationship between the demand curve and marginal revenue, it's essential to clarify what each represents:

- Demand Curve: Represents the relationship between the price a consumer is willing to pay and the quantity they will buy at that price, holding everything else constant. It is generally downward sloping for most goods, indicating an inverse relationship between price and quantity demanded.
- Total Revenue (TR): The total income a firm earns from selling its product, calculated as $TR = \text{Price (P)} \times \text{Quantity (Q)}$.
- Marginal Revenue (MR): The additional revenue gained from selling one more unit of output, calculated as the derivative of total revenue with respect to quantity ($MR = dTR/dQ$).

In perfectly competitive markets, the firm is a price taker, and the demand curve it faces is perfectly elastic (horizontal), which makes the MR curve identical to the demand curve. However, in markets with market power—such as monopolies—the demand curve the firm faces is downward sloping, and the relationship between MR and the demand curve becomes more nuanced.

Why Does the Marginal Revenue Curve Lie Below the Demand Curve? An Intuitive Explanation

The core reason why the MR curve always lies below the demand curve in markets with market power hinges on the price effect that occurs when a firm increases output:

- Price Effect: When a firm lowers its price to sell an additional unit, it not only gains revenue from that extra unit but also loses revenue on all previous units sold at higher prices.
- Quantity Effect: The additional revenue gained from selling one more unit.

In a downward-sloping demand scenario, lowering the price to sell an extra unit causes a reduction in the price that applies to all units sold previously, not just the marginal unit. This results in the marginal revenue being less than the price at the current quantity.

Key insight:

To sell an additional unit, the firm must reduce the price on all units,

which diminishes the marginal revenue gained from the extra sale. Therefore, the marginal revenue per unit decreases faster than the price itself, causing the MR curve to lie below the demand curve.

Mathematical Derivation and Explanation

A rigorous understanding involves the algebraic relationship between the demand curve and the MR curve:

1. Demand Function: $P = D(Q)$, where P is price and Q is quantity.
2. Total Revenue: $TR = P \times Q = D(Q) \times Q$.
3. Marginal Revenue:
 $MR = d(TR)/dQ$.

Applying the product rule:

$$\frac{d}{dQ} [D(Q) \times Q] = D(Q) + Q \times D'(Q)$$

Since $D(Q)$ is decreasing in Q (due to downward sloping demand), $D'(Q)$ is negative. Therefore:

$$MR = P + Q \times D'(Q)$$

Given that $D'(Q) < 0$, the second term ($Q \times D'(Q)$) is negative, which makes MR less than P :

$$MR < P$$

This inequality holds at every quantity where the demand is downward sloping, confirming that the marginal revenue curve always lies below the demand curve.

Graphical Illustration and Interpretation

Visualizing these relationships enhances understanding:

- The demand curve slopes downward from left to right.
- The total revenue curve initially rises, reaches a maximum, then declines as output increases.

- The marginal revenue curve intersects the horizontal axis at exactly half the quantity where TR is maximized, and it always remains below the demand curve.

Implications of the graph:

- When MR is positive, TR is increasing.
- When MR is zero, TR reaches its maximum.
- When MR becomes negative, TR declines.

This graphical depiction illustrates that the MR curve must lie below the demand curve because of the price effect, especially as the firm attempts to increase output.

Economic Intuition and Real-World Implications

Understanding this relationship has several important implications:

- Pricing Strategy: Firms with market power cannot simply set the price at the highest possible level or follow the demand curve to maximize revenue. Instead, they must consider the MR, which is always lower, to determine profit-maximizing output and price.
- Profit Maximization Condition: Firms maximize profit where $MR = MC$ (marginal cost). Since $MR < P$, the profit-maximizing price will be higher than MR but less than the demand price at that quantity.
- Market Power Limitations: The fact that MR is below the demand curve indicates inherent limitations for firms to increase prices or output without affecting revenue adversely.

Practical examples:

- A monopoly adjusting its output will recognize that increasing production reduces MR more than the price, constraining its ability to raise prices without losing revenue.
- Firms in monopolistic competition operate similarly, with their MR curve lying below the demand curve, influencing their pricing and output decisions.

Additional Factors and Caveats

While the fundamental principle holds broadly, certain factors can influence the precise relationship:

- Elasticity of Demand: The degree of demand elasticity affects the gap between MR and P. Highly elastic demand means MR is close to P, while inelastic demand widens the gap.
- Market Conditions: If demand becomes perfectly elastic (horizontal demand curve), MR coincides with demand, and the curve effectively lies on the demand line.
- Multiple Firms and Market Structures: In monopolistic or imperfectly competitive markets, the MR curve remains below the demand curve. In perfect competition, they coincide because firms are price takers.
- Cost Structures: When analyzing profit maximization, the position of the MC curve relative to MR determines the optimal output, not the demand curve directly.

Conclusion: The Underlying Economic Logic

In summary, the reason why the marginal revenue curve of a firm with market power always lies below its demand curve is rooted in the price effect associated with increasing output in a downward-sloping demand environment. To sell additional units, the firm must lower the price, which results in a decrease in revenue from previous units sold at higher prices. This effect causes MR to decline faster than the price, positioning the MR curve below the demand curve at every quantity.

Key takeaways:

- The downward slope of the demand curve causes the MR curve to lie below it due to the price effect.
- The algebraic relationship $MR = P + Q \times D'(Q)$ illustrates why MR is always less than P when $D'(Q) < 0$.
- Recognizing this relationship is essential for understanding how firms with market power set prices and quantities to maximize profits.

By grasping these concepts, students and economists can better analyze market strategies, regulatory implications, and the dynamics of imperfectly competitive markets.

The Marginal Revenue Curve Of A Firm With Market Power Will Always Lie Below Its Demand Curve Because

The Marginal Revenue Curve Of A Firm With Market Power Will Always Lie Below Its Demand Curve Because

Related Articles

- [Solomon Asch's Classic Experiment \(in Which Subjects Judged A Standard Line And Comparison Lines\) Was](#)
- [The Test Statistic, T, To Test The Hypothesis That \$1 = 2\$. Two Samples Are Randomly Selected And Come](#)
- [The Weight W.kg Of A Metal Bar Varies Jointly As It's Length L Metres And The Square Of It's Diameter](#)

[Back to Home](#)