The Monopolist’s Demand Curve

• Want to develop some key propositions about the demand curve

Many of these center on elasticities

Marginal Revenue and Elasticity

• Recall our definition of point elasticity

\[ \eta = \text{Slope} \frac{P}{Q} \]

• In the case of a linear demand function

\[ Q = a - bP \]
Marginal Revenue and Elasticity

- Recall our definition of point elasticity
  \[ \eta = \text{Slope} \frac{P}{Q} \]
  \( \text{Slope} = -b \)

- In the case of a linear demand function
  \[ Q = a - bP \]

Marginal Revenue and Elasticity

- A more general definition
  \[ \eta = \frac{dQ}{dP} \left( \frac{P}{Q} \right) \]

Restating the Elasticity

\[ \eta = \frac{dQ}{dP} \left( \frac{P}{Q} \right) \]

\[ \frac{1}{\eta} = \left( \frac{1}{\frac{dQ}{dP}} \right) \left( \frac{Q}{P} \right) \]

Restating the Elasticity

\[ \frac{1}{\eta} = \left( \frac{1}{\frac{dQ}{dP}} \right) \left( \frac{Q}{P} \right) \]

\[ P \frac{1}{\eta} = \left( \frac{dP}{dQ} \right) \left( \frac{Q}{P} \right)^P \]

\[ P \frac{1}{\eta} = \left( \frac{dP}{dQ} \right) Q \]
Marginal Revenue and Elasticity

• The Monopolist cares about MR.
• There is a relation between MR and elasticity.

\[ R = PQ \]

\[ \frac{dR}{dQ} = \frac{dP}{dQ} Q + P \]
Marginal Revenue and Elasticity

\[
\frac{dP}{dQ} = MR - P
\]

\[
MR = \frac{dP}{dQ} + P
\]

\[
MR = P \left( \frac{1}{\eta} + 1 \right) = P \left( 1 + \frac{1}{\eta} \right)
\]

First Elasticity Relation

\[
MR = P \left( 1 + \frac{1}{\eta} \right)
\]

Second Elasticity Relation

\[
MR = P \left( 1 + \frac{1}{\eta} \right)
\]

Second Elasticity Relation

\[
MR = P \left( 1 + \frac{1}{\eta} \right)
\]

Second Elasticity Relation

\[
MC = P \left( 1 + \frac{1}{\eta} \right)
\]

Second Elasticity Relation

\[
P \left( 1 + \frac{1}{\eta} \right) = MC
\]
Second Elasticity Relation

\[ P = \left( \frac{MC}{1 + \frac{1}{\eta}} \right) \]

Third Elasticity Relation

\[ P(1 + \frac{1}{\eta}) = MC \]

Third Elasticity Relation

\[ P + P \left( \frac{1}{\eta} \right) = MC \]

Third Elasticity Relation

\[ P - MC = -P \left( \frac{1}{\eta} \right) \]

Third Elasticity Relation

\[ \frac{P - MC}{P} = -\frac{1}{\eta} \]
A Summary

\[ MR = P \left( 1 + \frac{1}{\eta} \right) \]

\[ \frac{P - MC}{P} = -\frac{1}{\eta} \]

\[ P = \left( \frac{MC}{1 + \frac{1}{\eta}} \right) \]